Service Manual

OPTIQUEST 1562A-2

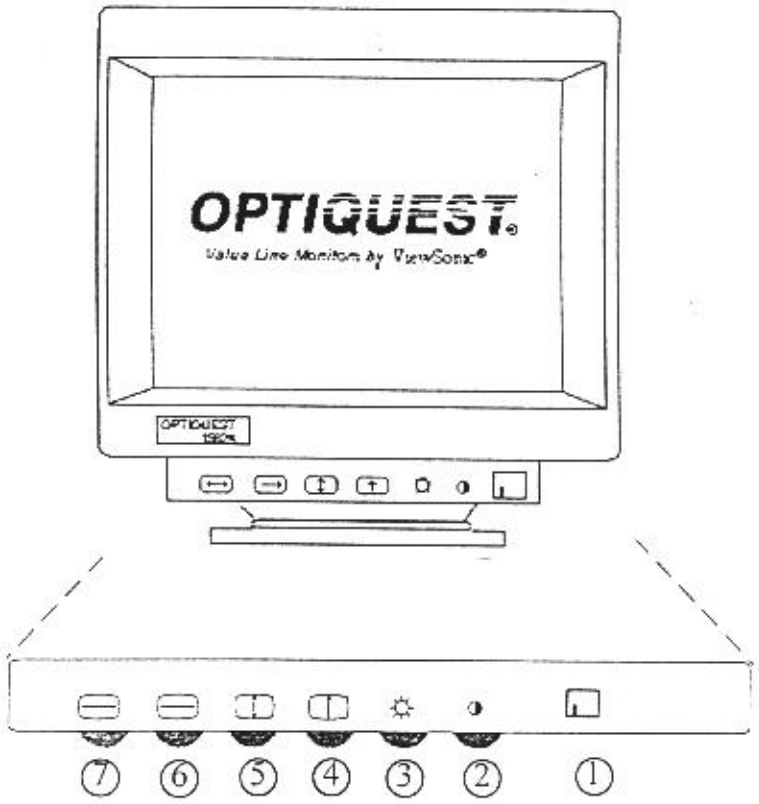
Model No. 1562A-2

15" Analog Controlled Color Monitor
Value Line Series

(Rev. 1 - July 1996)

ViewSonic® 20480 E. Business Parkway, Walnut, California 91789 USA - (800) 888-8583

1.1. Monitor Control Locations & Functions



KEY TO CONTROL FUNCTIONS		
(1)	Power ON/OFF Button	Push in to turn display on. Built-in power-on indicator will illuminate. Push again to turn off.
(2)	Contrast	Rotate clockwise to increase contrast. Rotate counterclockwise to decrease contrast.
(3)	Brightness	Rotate clockwise to increase brightness. Rotate counterclockwise to decrease brightness.
(4)	Vertical Position	Rotate clockwise to move displayed area upwards. Rotate counterclockwise to move displayed area downwards.
(5)	Vertical Size	Rotate clockwise to increase vertical size of displayed area. Rotate counterclockwise to decrease vertical size of displayed area.
(6)	Horizontal Position	Rotate clockwise to move displayed area to the left. Rotate counterclockwise to move displayed area to the right.
(7)	Horizontal Size	Rotate clockwise to increase horizontal size of displayed area. Rotate counterclockwise to decrease horizontal size of displayed area.

1.2. Product Overview

The monitor 1562A (Model: 1562A-2) described in this service manual has the following features:

- 15 inches 0.28mm dot pitch FST CRT
- 31,35-40,46-51,56-62 kHz selective quad-mode
- Six preset modes
- Universal segmented auto range Power Supply
- VESA compliant power management features
- VESA compliant DDC1/DDC2B interface

1.3. CRT Characteristics

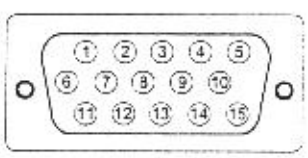
- Screen Size ..... 15 inches
- Faceplate Type ..... Flat square
- Phosphor Dot Pitch..... 0.28mm
- Electron Gun..... 29mm,Precision-In-Line
- Deflection Angle ..... 90 degree diagonal
- Shadow Mask..... Invar
- Phosphor Type P22
- Phosphor Persistence ..... Medium Short
- Faceplate Properties ..... Silica coating
- Standard Light Transmission 57% Typical

1.4. Power Specifications

- A/C Receptacle..... IEC320
- Power Supply Type ..... Universal
- A/C Line Voltage Ranges .. 88VAC-132VAC
180VAC-264VAC
- A/C Line Frequency Ranges 50Hz/60Hz±3Hz
- Inrush Current..... 30A/132V or
50A/264V (at cold start)
- Leakage Current..... ≤3.5mA
- Degauss..... Automatic at power-on
- Power Consumption..... <110w at full power in full scan operation

1.5. Video Input Signal Characteristics

- Video Type..... Analog
- Amplitude..... 700mV maximum
- Video Input Impedance .... 75 Ohms±1%
- VESA DDC1/DDC2B Video Connector Pin Assignments:



pin	Signal	pin	Signal	pin	Signal
1	Red video	6	Red GND	11	Monitor GND
2	Green video	7	Green GND	12	SDA
3	Blue video	8	Blue GND	13	H. sync
4	Monitor GND	9	No pin	14	V.sync(VCLK)
5	Return	10	Sync return	15	SCL

1.6. Sync Input Signal Characteristics

1.6.1. Separate Sync

- Sync Type ..... TTL
- Amplitude ..... 2.4V minimum(Logic High)
0.8V max.(Logic Low)

  Low)
- Polarity..... Positive or Negative

1.7. Video Amplifier Performance

- Video rate..... 86MHz
- Bandwidth 35MHz
- 10% to 90% Rise and fall times
(Measurement shall be made at CRT connector, with output swinging 30Vpp)
- Video generator rise/fall time 2ns maximum
- Scope and probe bandwidth. 350MHz minimum
- Probe capacitance..... 2.5pf
- Overshoot/Undershoot..... 15% max.

1.8. Environmental

1.8.1. Temperature/Humidity/Altitude

OPERATING

- Temperature..... 10°C to 40°C
- Relative Humidity ... 5 to 95%,non-condensation
- Altitude ..... 0 to 10,000 feet

NON-OPERATING

- Temperature..... -40°C to +65°C
- Relative Humidity ... 0 to 95%,non-condensation
- Altitude ..... 0 to 40,000 feet

1.8.2. Vibration Test

UNPACKED UNIT

	Frequency	Amplitude	Acceleration(G)
1	5-22Hz	0.25mm	-
2	22-500Hz	-	0.25G

Times/Cycle:

- Rise Time..... 10 Minutes
- Fall Time ..... 10 Minutes

- ☐ Number of Sweeps ..... 1 Cycle
- ☐ Axis ..... X,Y,Z
- ☐ Total Times ..... 60 Minutes

PACKAGED UNIT

	Frequency	Amplitude	Acceleration(G)
1	5-50Hz	-	0.83
2	-	-	-

Times/Cycle:

- ☐ Rise Time..... 10 Minutes
- ☐ Fall Time ..... 10 Minutes
- ☐ Number of Sweeps ..... 1 Cycle
- ☐ Axis ..... X,Y,Z
- ☐ Total Times ..... 60 Minutes

1.8.3. Drop Test

- ☐ Compliant with NSTA Project 1A guidelines
- ☐ Drop Height..... 61cm
- ☐ Test Direction ..... 1 Corner, 3 Edges, 6 Faces

1.9. Preset Timing Modes

This display has 6 preset display modes configured during manufacture, as follow :

- ☐ 1 at 31 kHz
- ☐ 2 at 35-40 kHz
- ☐ 2 at 46-51kHz
- ☐ 1 at 56-62 kHz

The detailed specifications of the preset timing modes are given in the following tables.

Model No.	Hf KHz	Vf Hz	Dot x Line
01	60.023	75.029	1024x768
02	48.363	60.004	1024x768
03	46.875	75.000	800x600
04	37.879	60.317	800x600
05	37.500	75.000	640x480
06	31.469	59.942	640x480

Section 2.
Disassembly Instructions

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2.3. Internal Disassembly (Left Side) 2-1
2.4. Removing the Neck Board and Main Board 2-2

2.1. Removing the Rear Cover

1. Remove the two screws at the rear of the display. Refer to the figure 2-1 (A).
2. Turn the display so it is resting face downwards on the work surface. Be sure to place a cloth or other soft material on the work surface to avoid scratching the screen surface.

   Insert a flat headed screwdriver in the two slots at the top of the display one at a time, and gently lever outwards to release the catches, as illustrated in Figure 2-1 (B). At the same time pull the cabinet upwards and lifted away. Thread the video cable through the opening in the cabinet rear.

   You should now return the monitor to a horizontal position before commencing with further disassembly.

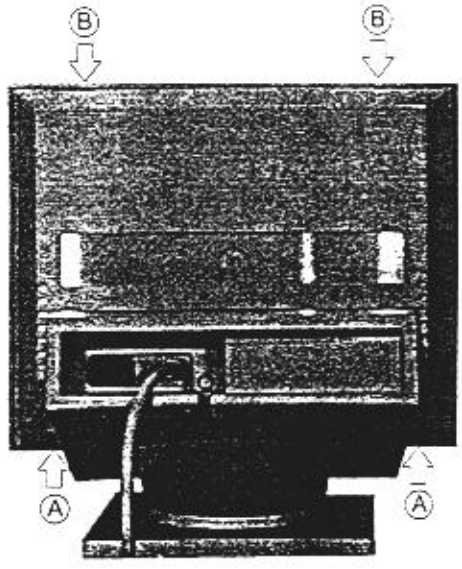


Figure 2-1 Remove the Rear Cover

2.2. Internal Disassembly (Right Side)

The neck board is plugged on to the CRT neck and is enclosed in a metal shielding.

1. Cut the two cable ties indicated to free the cables. Refer to the figure 2-2 (A).
2. Disconnect the degaussing coil from the Main Board. Refer to the figure 2-2 (B).
3. Disconnect the two connector pins from the Neck Board. Refer to the figure 2-2 (C).
4. Disconnect the two ground wires from the Neck Shield and rear panel. Refer to the figure 2-2 (D).

2.3. Internal Disassembly (Left Side)

1. Cut the four cable ties indicated to free the cables. Refer to the figure 2-3 (A).
2. Disconnect the connector pin from the Neck Board. Refer to the figure 2-3 (B).

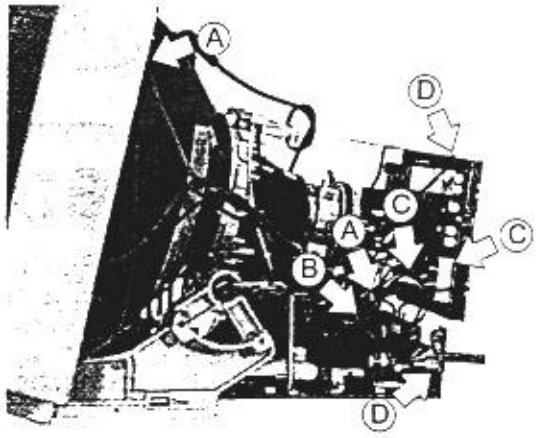


Figure 2-2 Internal Disassembly (Right Side)

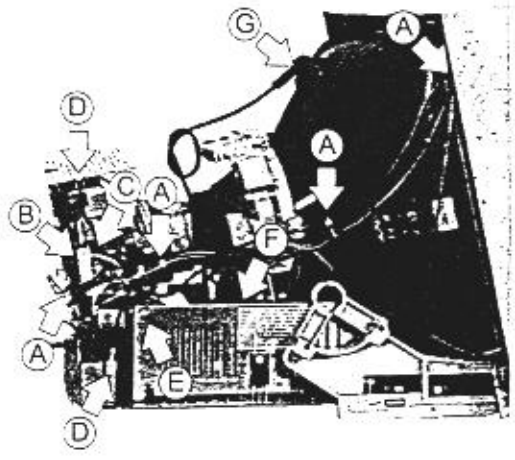


Figure 2-3 Internal Disassembly (Left side)

3. Disconnect the CRT ground pin from the Neck Board. Refer to the figure 2-3 (C).
4. Disconnect the two ground wires from the Neck Shield and rear panel. Refer to the figure 2-3 (D).
5. Remove the screw at the FBT cover. Refer to the figure 2-3 (E).
6. Remove the connected pin from the Main Board. Refer to the figure 2-3 (F).

IMPORTANT NOTE

To avoid risk of electric shock, before removing the anode cap, made sure the anode has been completely discharged as high voltage may remain on the anode for extended time after power off.

7. Remove the anode cap from the CRT. Refer to the figure 2-3 (G).

2.4. Removing the Neck Board & Main Board

1. Remove the five ground wires from the Neck Board and rear panel. Refer to the figure 2-4 (A).
2. Remove the Lock Cap from the nylon ties, and remove the Neck Shield from the Neck Board. Refer to the figure 2-4 (B).
3. Remove Neck Shield.
4. Remove Neck Board.
5. Remove the Main Board.

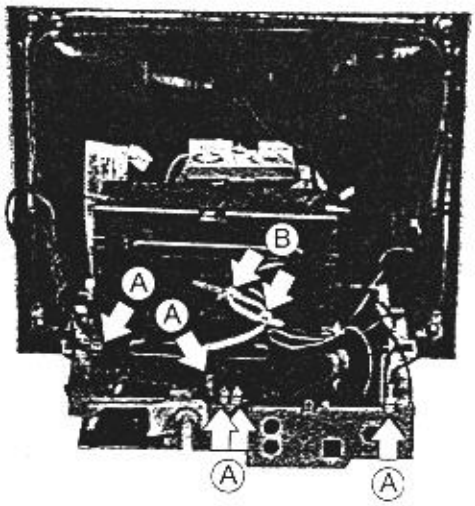


Figure 2-4 Remove the Neck Board and Main Board

Section 3.
Theory of Operation

3.1. Switching Power Supply 3-1
3.2. The Deflection Circuit 3-2
3.3. Video Amplifier 3-8

3.1. Switching Power Supply

The switching power supply (SPS) used in this display is a 110W flyback mode type. The power supply provides six outputs (B+, 78V, 15V, -12V, 6.2V and 5V). Please refer to schematic diagram for details of the circuit layout. The input voltage is from 85VAC — 270VAC with an input frequency of 48Hz — 62Hz.

The current first passes through the EMI control circuit and is regulated to DC by the bridge diodes (D1-D4) and filter capacitor (C10). During rectification a large current surge is generated and as C10 has a very low impedance while being charged the fuse, on/off switch and bridge diode are all liable to be damaged. For this reason, a thermal resistor (THMER) is added before the bridge diode in order to limit the large current surge generated during the charging of the capacitor.

During rectification, C14 is charged through R8 and R9. When C14 is charged to 16V, IC13842A starts to operate (for details, of the functions of this IC, please refer to the relevant data sheet) and outputs a pulse signal from Pin 6 to set the transistor Q1 in the ON state. At this time, transformer T3, which is connected in parallel, starts to store power. When the current passing through the resistor R32, and the supplementary current from R13, R36 and R45 (Pin 4 to Pin 3) into Pin 3 of IC1 reaches 1.1V, IC1 is reset, causing the energy stored by the transformer to reach the rated value. In order to prevent the transformer from being saturated and causing damage to the transistor, when transistor Q1 is in the OFF state, the energy stored in the transformer T3 is released into the secondary coil and is regulated through the various output loops and filters and converted to the required DC output. In addition to this, at the appropriate time, the windings 7S-7F supply Pin 7 of IC1 with a fixed power supply for normal operation. Also, when windings 7S-7F are in power saving active state, power is supplied to Pin 7 of IC1 for normal operation.

In any of the above cases, the output pulse is terminated and the FET is turned off, causing the voltage on the output of the FET to rise rapidly, and the voltage across the winding of the primary to reverse in polarity, thus tending to reset the flux within the core. At this point, the diodes D61-D65 on the secondary supply winding become forward biased and begin to conduct, thus transferring energy from primary to the secondary, and charging the secondary capacitors.

When the feedback signal passing through the main 50.5V output is completed, the transistor's duty cycle is adjusted through the transfer to Pin2 of IC1 3842 of the primary coil by PH1 4N35 and IC61 TL431, stabilizing the output current. At this time, it is important to note that before the feedback signal is established, the charge level of C18 cannot trigger Q5 SCR or it will cause a faulty power startup . In addition, in order to synchronize the supply power and monitor and reduce noise that will cause interference to the display, in the area D12 the monitor's feedback transformer gets a feedback signal in order to ensure synchronization between the power supply and monitor with synchronization in the range 31.5kHz-64kHz. Because the power operation frequency changes with the monitor causing changes in the value of IP (the value of LP is fixed while the value of IP increase or decreases according to the frequency), this affects the test value of Pin3 of IC13842A. This causes the total power supplied to vary according to the frequency, so a compensatdion value is provided by D13 in order to reduce the difference in total power for different frequencies. In addition, because the AC input ranges from 85V AC to 270V AC, this causes

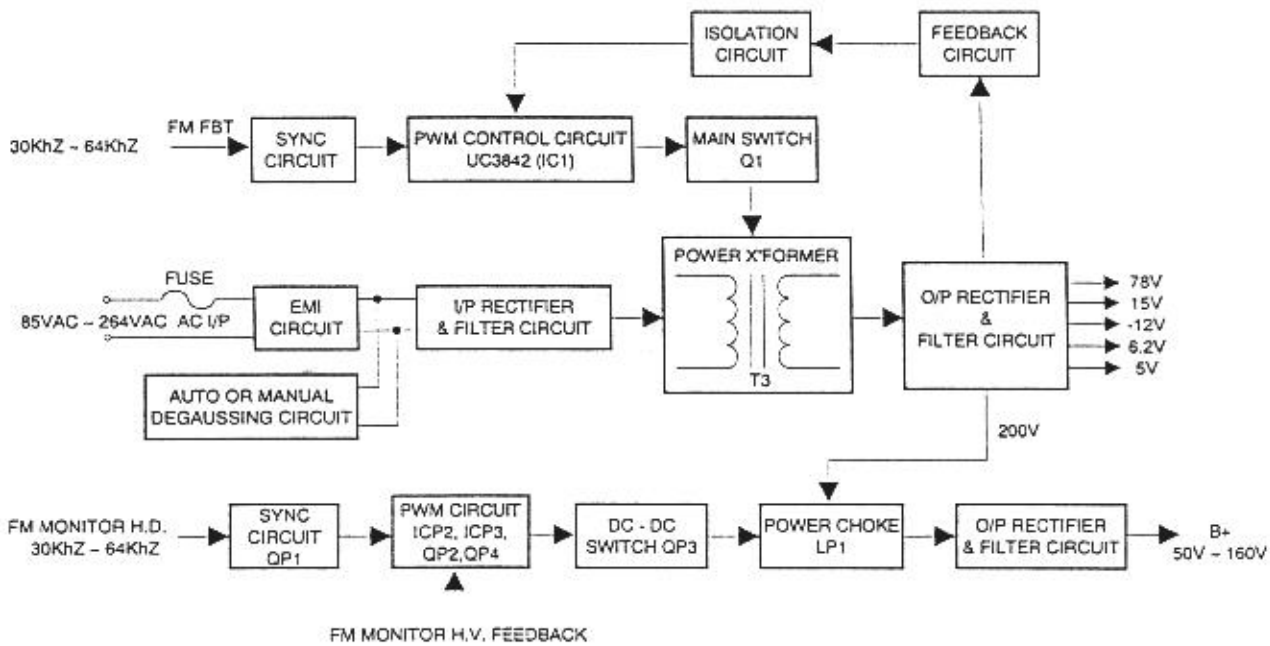


Figure 3-1 Switching Power Supply Block Diagram

the value of the direct current on the DC bus to vary, affecting the rise rate of IP, the oscillator and the duty cycle, and causing the test value obtained at Pin3 of IC1 to vary. To resolve this, a compensation value is provided by R13 and R36 which reduces the difference resulting from the different input voltages.

The 5V power supply is driven by one of two sources, in normal operation when the 50.5V is presented, the 5V regulator ICP1 is fed from the 15V rail through diode D69. When switched to stand by mode (50.5V rail drops to 12V) then the 15V rail drops too low to supply ICP1. In this case Q62 take over and maintains the supply to ICP1 at around 8V.

In addition to the 5V regulated supply, in normal operation there is also a 15V regulated supply take from the 15V rail.

3.1.1. Auto-degaussing

When the monitor is cold start, the degaussing function operates automatically. The resistance of PTCR1 increases as it gets warm-up. As a result, it limits the current, and the degaussing function becomes inactive.

3.1.2. DC to DC Circuit

Another special characteristic of this power supply is the addition of a DC to DC circuit to the output. In order to support the monitor at different frequencies, a similar high voltage is required (25kV). To accommodate this requirement, a boost loop has been added to the 50.5V output. The synchronization signal is gotten from the monitor H.D. area. After getting synchronization through QP1 trigger pin2 of ICP2, a high voltage feedback signal, FB is input to QP2 to obtain the DC level. A comparison is carried out between pin5 of ICP2 and ICP3 to establish the duty cycle of transistor QP3 (2SK947) so that even under different frequencies, a similar high voltage value is still obtained. When switching between modes, in order to limit the current of choke LP1 to prevent the choke from being saturated, the current limitation resistor RP20 is used. When the current exceeds a specified value, the limit DC to DC loop is cut in to provide protection.

3.2. The Deflection Circuit

Please refer to the block diagram of the deflection circuit and video circuit in figure 3-2, in the next page.

3.2.1. IC101 WT8045

1. H-sync and V-sync are input separately at pins 3 and 4, with both negative and positive polarity being accepted. Output is made at pins 5 and 6, with all output being negative polarity TTL level.

2. When there is no input of either H-sync or V-sync, PM1 is low and the LED will change color. If the I/O cable has not been connected, causing H-sync and V-sync input to be high, then the monitor is in free running mode.

The Truth Table of Power Saving Detector					
Mode	Hs in	Vs in	PM1	PM2	PM3
ON	Pulse	Pulse	1	1	1
Stand-by	No pulse	Pulse	0	1	1
suspend	Pulse	No pulse	0	0	1
OFF	No pulse	No pulse	0	0	0
Override	1	1	1	1	1

3. Pins 7, 8, 9 and 13 function as frequency discriminator pins, as shown in the table, below.

Truth Table of Frequency Discriminator				
IC101 WT8045 Signal Hsync	Pin 9	Pin 8	Pin 7	Pin 13
Hs < 33K	1	1	1	1
36K > Hs > 33K	0	1	1	1
45K > Hs > 36K	0	0	1	1
52K > Hs > 45K	0	0	0	1
64K > Hs > 52K	0	0	0	0

These pins are used to control Cs or other different frequencies.

For example:
When a VGA 31.4kHz 640x480 or ERGO VGA 640x480 frequency is input, Pin 21 of IC101 is low, as required by the circuit. If there is no frequency separation, then these two modes will be confused so Pin 9 (F33K) is used to perform discrimination. Other Cs control or drive switching are all controlled by Pin 5,7,8,13.

4. Pins 10 and 11 serve as vertical F/V output; pins 17 and 18 as HOR. F/V output. Due to the difference in the duty of the RC time constant input through Pin 11 or Pin 17, pins 10 and 18 output different square waves (the ON duty is different). The higher the input frequency of H or V, the larger the square wave ON duty is. Pins 10 and 18 are structured as an open drain and require the addition of a pull-high resistor.

5. Pins 19 — 27 serve as mode control pins and use the frequency, polarity and scanning line, etc. to discriminate between modes.

   When the H-sync and V-sync input signals are 800x600 48kHz/72Hz, Pin 24 is low and other pins are high.

   When the H-sync and V-sync input signals are 800x600 37.8kHz/60Hz, Pin 23 is low and other pins are high, and so on.

   Pins 19 — 27 are structured as an open drain and require the addition of a pull-high resistor.

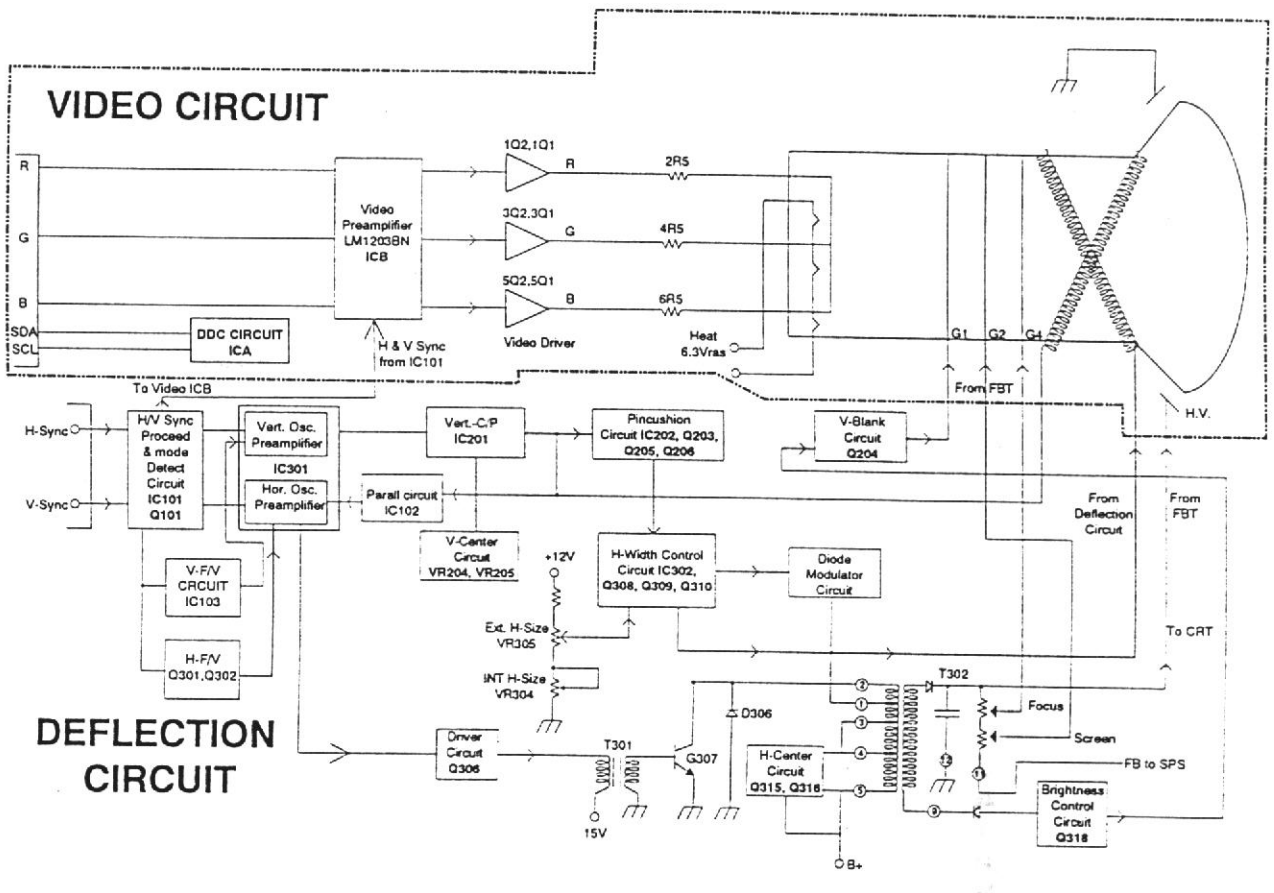


Figure 3-2 Video,Logic and Deflection Block Diagram

3.2.2. IC301 TDA9102C/F

1. IC301 TDA9102C is a horizontal and vertical processor. The horizontal section consists of a TTL interface, two comparators and an oscillator. The vertical section consists of a TTL input interface and an oscillator. This IC includes a voltage stabilizer to provide about 8V.

2. When sync is input as a TTL level, this causes a negative edge trigger. Pin 4 serves as the H-sync input point and Pin 14 as the V-sync input point.

3. Pins 6 and 7 are the collector (C) and emitter (E) of the IC's internal transistor. The output from Pin 6 is not enough to drive T301 as the output current of IC301 is small, so Q306 used to amplify the current to drive T301.

4. Pins 1 and 2 provide the external control of the horizontal oscillator free run. Free run is controlled by changing the resistance value of VR301 and R308 to obtain different DC voltage levels. By adding an external F/V on Pin 1, the difference between a variety of input frequencies and free run is maintained at a similar level. In this way, when different timing modes are input, if the ratio between the active display and total display is similar, then the position of the phase will also be similar.

5. Pins 12 and 13 provide the external control of the vertical oscillator free run. Free run is controlled by changing the resistance value of VR201 and R205 to obtain different DC voltage levels. By adding an external F/V on Pin 12, the difference between a variety of input frequencies and free run is maintained as similar. The vertical free run trigger synchronization point will affect the amplitude of Pin 15 V-Output. Since the difference between each input frequency and free run is similar, this means the synchronization trigger level is also similar, making the V-Output at Pin 15 also similar. As long as the ratio of the hight of

active display to total display is similar, then V-Size will be similar.

6. The Horizontal phase of different modes can be individually adjusted by changing the VDC level at Pin 10.

7. The vertical size of different modes can be individually adjusted by changing the VDC level at Pin 16.

8. The vertical linearity can be changed by altering the VDC level at Pin 17.

3.2.3. Vertical Deflection Circuit

1. IC201 TDA8172 consists of a flyback generator, voltage stabilizer, drive circuit and vertical output amplifier.

2. The vertical oscillator circuit

   (a) The frequency and phase of the vertical oscillator circuit is generated by the vertical synchronization signal.

   (b) The synchronization signal is input from Pin 14 of IC301 TDA9102C and, after being processed by the synchronization circuit, is sent to the vertical synchronization oscillator circuit to trigger the vertical oscillator and synchronize the oscillator frequency with the external synchronization signal. The frequency of its internal free oscillation is set by the time constant of VR201 and C202. Otherwise from pin 6 of IC101 V-output signal to trigger the oscillator pin 2 of IC103 which to make a square wave. This waveform is converted to a DC level through an invertor Q202 and RC filter R208, C205, R207, C203. This DC voltage set bias of Q201 (base), thus controlling Ie magnitude of Q201, which in turns setting the free run frequency of IC301. The F/V voltage output from IC103 is used to maintain the difference between the free oscillation frequency and external synchronization signal frequency at a similar level and make the sawtooth wave amplitude from Pin 15 of IC301 the same (please refer to item 5. of the explanation of IC301 TDA9102C).

3. **Vertical Size Control**

   The pulse voltage output by the oscillator is sent to the sawtooth wave generator. The size and amplitude of the voltage of the sawtooth wave generation is adjusted using VR202, VR203 and the vertical size can thus be controlled. This sawtooth wave voltage passes through a buffer and is output from Pin 15 of IC301 to Pin 1 of IC201 TDA8172 of the vertical drive circuit.

4. **Vertical Drive Circuit**

   (a) It is not sufficient to rely solely on the oscillator circuit output to ensure the stability of the vertical output, so a first or second level amplifier circuit must be inserted between the oscillator circuit and the output. This circuit is called the drive amplifier and in addition to amplifying the sawtooth wave also corrects the vertical linearity.

   After adding the drive circuit, because the level of amplification can be considerable, enough negative feedback can be added to correct vertical linearity and increase the stability of the circuit.

   (b) If the current of the sawtooth wave flowing through the deflection yoke is distorted, then the top and bottom portions of the display will be expanded or compressed, resulting in poor linearity. In order to solve this problem, correction of the linearity of the sawtooth wave can be carried out before the drive level.

5. **IC201 TDA8172 Vertical Drive Circuit**

   (a) IC201 uses a double power source, so it can be viewed as an OCL drive amplification circuit.

   (b) Pin 15 of IC301 outputs a sawtooth wave which is input from Pin 1 of IC201 and after being amplified is output from Pin 5 of IC201 to the vertical deflection yoke. R220 through R219 negative feedback to Pin 1 to increase the stability of the circuit.

   (c) Pin 3 of C213 is connected to Pin 6 of D203 to make a compensatory circuit in order to reduce power consumption during flyback operations.

6. **Vertical Centering Adjustment**

   Since IC201 functions as an OCL circuit, VDC is output from Pin 7 of IC201, so the central current can be changed to shift the on-screen display up or down to prevent voltage fluctuation. After adjusting the power stabilizer at Pin 19 of IC301 TDA9102C (about 8V) with VR204, VR205 and R222, this is input to Pin 7 of IC201 to change the value of the vertical center.

3.2.4. Pincushion Correction Circuit

1. If the width of the border in the center of the screen is insufficient, the waveform shown in

   Figure 3-3, below, can be used to add to horizontal deflection B+ in order to change the deflection of the horizontal deflection circuit.

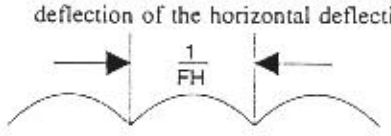
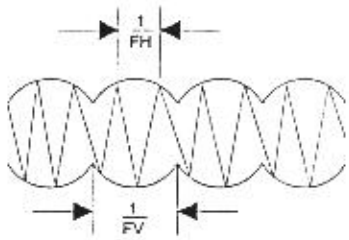


Figure 3-3 Voltage Correction Wave

This waveform is the parabola obtained after

regulation of the vertical period, and is created to perform amplitude modulation on the horizontal deflection current, as shown in Figure 3-4.



FH: Horizontal Frequency
FV: Vertical Frequency

Figure 3-4 Current Correction Wave

2. The sawtooth wave is output from Pin 15 of IC301 (the size of the amplitude of this wave can be adjusted using VR202) and through IC202 TDA4950 for integration regulation into a parabola. It is output from Pin 5 of IC202 and passed through C325 and R240 and input to Pin 6 of IC302. It is then output from Pin 7 of IC302 and after being sent to Q308's collector output, is added to horizontal B+ to provide pincushion distortion correction.

3.2.5. IC202 TDA4950 Circuit Operation

1. TDA4950 consists of a comparator, a wave regulator and a current limiter.
2. The sawtooth wave from Pin 15 of IC301 passes through R218, coupled to Pin 2 input, with Pin 3 being a fixed reference current, and after VDC conversion in VR207 achieves KEYSTONE compensation.
3. The H-sync signal from pin 7 of T302, passes through R344, D206, C222, Q203 RC time constants to make a sawtooth wave, passes through C221 coupled to Q205 which is input to pin 8 of IC202. The R241 and VR206 can change the DC level of the sawtooth wave and after passing through pin 1 and pin 2 of IC202 the wave regulator, thus a fixed parabola wave is generated at pin 7, so the VDC of the sawtooth wave at pin 8 must be the same as the VDC of pin 7. Please refer to figure 3-5.

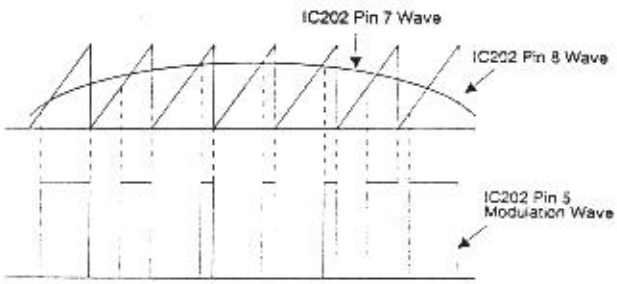


Figure 3-5 IC202 Pin 7 and Pin 8 Waveform

After the waveform has been modified, although the horizontal frequency is not the same, the waveform output at Pin 5 is not the same, and for this reason can be used to correct pincushion distortion. The waveform output from Pin 5 of IC202 is a square wave, and after being integrated by R240 and C220, passes through C325 and is coupled to Pin 6 of IC302.

3.2.6. Structure of Horizontal Deflection Circuit

The function of the horizontal deflection circuit is to cause left/right scanning of the electron beam using the sawtooth wave current flowing through the horizontal deflection yoke, and is made up of the horizontal oscillator circuit, horizontal drive circuit, horizontal output circuit, synchronous AFC circuit and high voltage generator circuit.

1. **Horizontal Drive Amplifier**

   In order to rapidly saturate the output transistor (ON) or cut it off (OFF), a sufficient basic current must be provided. Because of this, an amplifier circuit is added between the oscillator circuit and the output circuit to amplify the pulse voltage. At the same time, after the waveform has been regulated, by adding this circuit to the output circuit, this amplification circuit functions as a drive amplifier.

2. IC TDA9102 consists of a vertical sawtooth wave generator, horizontal sawtooth wave generator, horizontal oscillator circuit, vertical oscillator circuit, AFC circuit, phase regulator circuit, X-RAY circuit and drive amplification circuit. This IC includes the vertical and horizontal circuits combined in one package.

   When the horizontal signal is sent to Pin 8 of the AFC circuit and receives a pulse back to Pin 4 from the horizontal output, the difference between these two phases is used to calculate the Automatic Frequency Control (AFC) voltage, and control the frequency of the horizontal oscillator circuit at Pin 8 through C351, R345, R316 and ZD305. The horizontal frequency is determined by the time constant of R308, VR301, R310, C301, C303 and C302, and is output from pin 6, coupled through Q306,T301, and supplies the base current for the horizontal output transistor Q307. This is the basic procedure of horizontal deflection.

3. **Horizontal Output Circuit**

   The horizontal output circuit uses the switch operation of a transistor and a damping diode, and provides a sawtooth wave current to the deflection yoke. The horizontal deflection yoke is made up of the L value on the coil and resistance r inside the coil connected in series. Its resistance is extremely small, and the time constant (L/r) is extremely large. Because of this the voltage at the two terminals of the coil

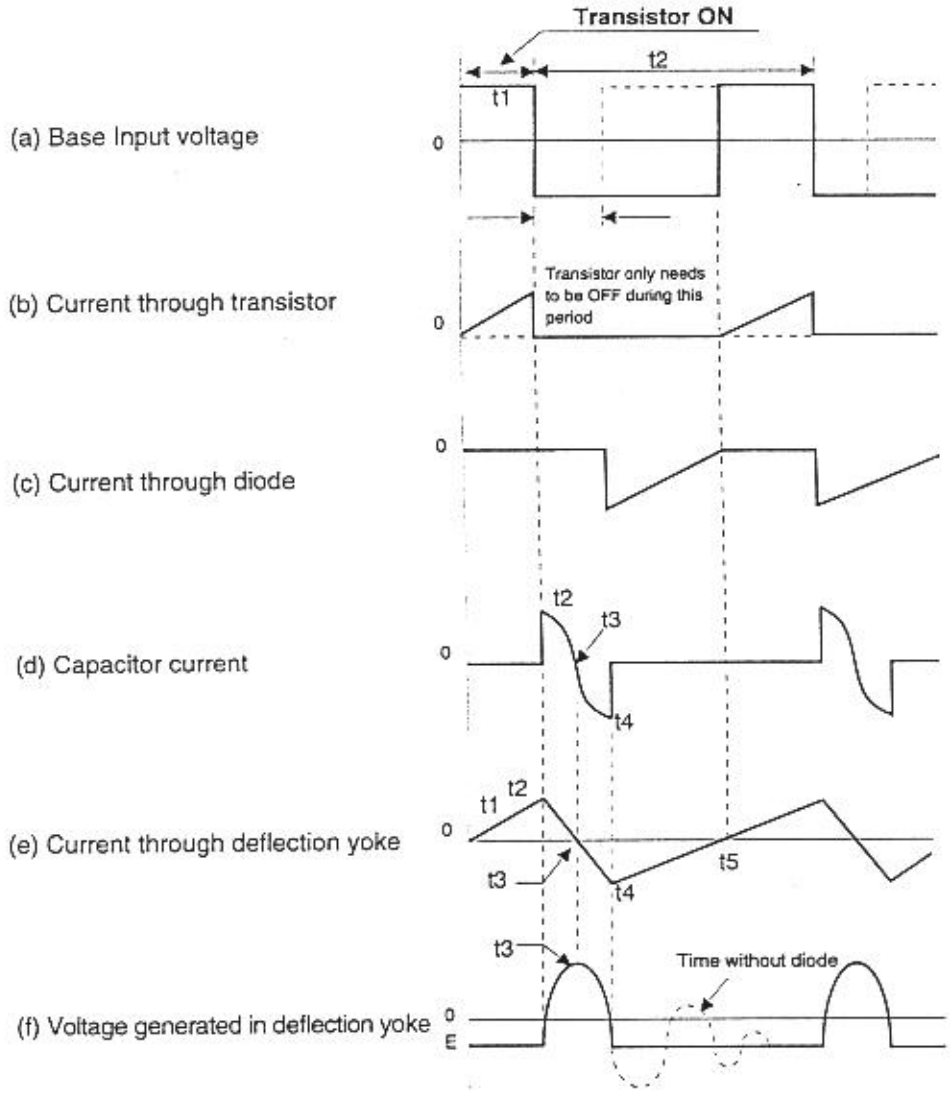


Figure 3-8 Horizontal Output Voltage/Current Waves

3.2.9. Spot Killer

After stabilization at power-on, Q318 is in the ON state and G1 is -40 or -60V. When power is turned off, from pin 7 of T302 through D312 output disappears for a short time causing Q318 to go OFF and G1 goes high for a short time, eliminating the power-off spot.

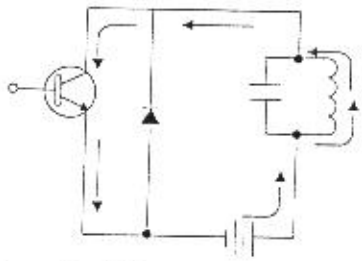
3.2.10. X-RAY Protection Circuit

The feedback pulse voltage from T302 FBT is regulated through D316 to obtain a DC voltage,and the appropriate set voltage is distributed by R346 and R372, through ZD305 and is input to Q314 and Q313 . From the emitter of Q313,it sents to Pin 1 of IC303. When the feedback pulse voltage exceeds the set voltage, Q314 and Q313 are ON,and the +12V output from Pin 2 of IC303 is OFF. Because of this, IC301 TDA9102C is OFF, so there is no vertical or horizontal sync output,and the monitor shuts down.

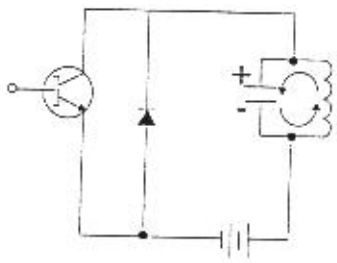
3.2.11. Horizontal linearity and CS Switching

Switching CS is necessary to ensure the lines are in accordance with the specifications in multi-sync monitors.

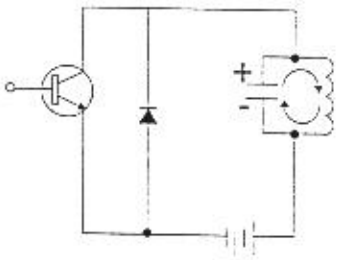
- For frequencies 52~60kHz, Q101 is OFF, Q311 is OFF , Q312 is OFF, RL301 is OFF, so the CS is C316, linearity coil is L303 and L304 in parallel.
- For frequencies 45~52kHz, Q101 is OFF, Q311 is OFF , Q312 is ON, so the CS is C316 and C318 in parallel, linearity coil is L303 and L304 in parallel.
- For frequencies 33~45kHz, Q101 is ON, Q311 is ON , Q312 is OFF, so the CS is C316 and C317 in parallel, linearity coil is L303.
- For frequencies 29~33kHz, Q101 is ON, Q311 is ON , Q312 is ON, so the CS is C316, C317 and C318 in parallel, linearity coil is L303.



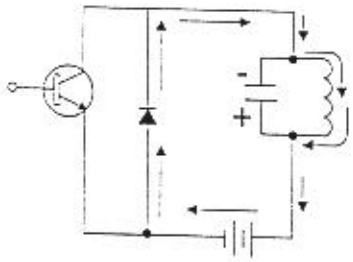
(a) Second half of scanning period (t1 - t2)



(b) First half of return line period (t2 - t3)



(c) Second half of return line period (t3 - t4), capacitor releases current



(d) First half of scanning period (t4 - t5)

Figure 3-9 Polarity of Transformer Voltage

Truth Table of Freguency Discriminator				
IC101 pin number / Frequency range	pin 9 (33kHz)	pin 8 (36kHz)	pin 7 (45kHz)	pin 13 (52kHz)
29~33kHz	1	1	1	1
33~36kHz	0	1	1	1
36~45kHz	0	0	1	1
45~52kHz	0	0	0	1
52~60kHz	0	0	0	0

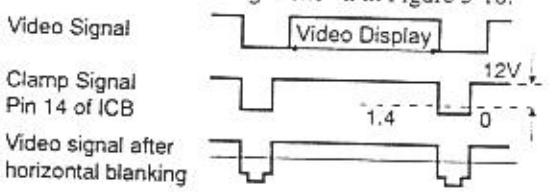
3.3. Video Circuit

The video circuit is made up of the pre-amplifier and post output amplifier. It sends the video signal to the CRT's cathode and causes the anode CRT to display the required image. Refer to the combined deflection circuit and video circuit block diagram on figure 3-2, on page 3-3.

1. The pre-amplifier is controlled by ICB (LM1203BN), as shown in Figure 3-2. ICB is made up of three individual amplifiers which are used to amplify the R, G,B signals.

   Pins 16, 20 and 25 are the pre-amp outputs, and the output signals' Vp-p values are controlled by Pin 12, with Pins 18, 22 and 27 used for individual control; the DC value being used to determine the amplification level. The output signals are controlled by Pin 14 and Pins 15, 17, 19, 21, 24 and 26 are separately controlled according to the DC voltage.

   Pin 14 of ICB is the clamp 1 signal input for a negative signal, and Pin 5 of IC101 Clamp1 is reversed through 7Q4 and sent to Pin 14 of ICB. If this signal is not present, then ICB is not output. The relationship between the signal and the timing is shown in Figure 3-10.



NOTE:

A. Clamp1 signal is generated from Pin 5 of IC101

B. When the Clamp1 signal is less than 1.4Vp-p, the IC's internal clamp loop will operate; when greater than 1.4Vp-p, it will not operate.

Figure 3-10 Timing of Pin 14 Clamp Signal

ICB (LM1203BN) is the pre-amplifier and is made up of a comparator. The reference voltage is set at Pins 15, 19 and 24 with the flyback voltage of Pins 17, 21, and 26 used for comparison and which cause the capacitors of Pins 5, 8 and 10 to charge or release power to control the video amplification output.

3.3.1. The Post Output Amplifier

1. The post output amplifier is a serial circuit made up of base 5Q2 and emitter 5Q1 (current amplifier), as shown in Figure 3-11. It has a very wide band echo and the video signal is coupled to the CRT cathode through 6R5.

2. 6R4 is the negative resistors for the output. 5L3 is a peaking coil, and the coil and the circuit

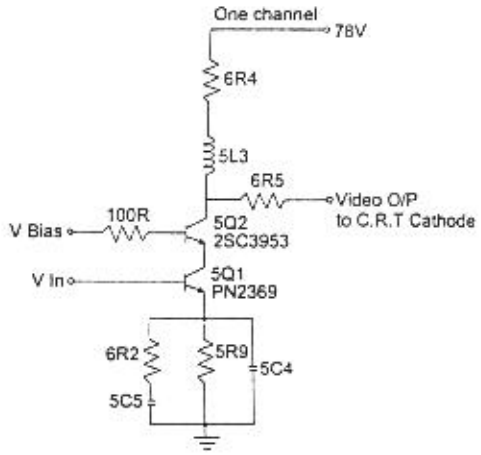


Figure 3-11 The Post Output Amplifier Circuit

allocation capacitor makes up the oscillation circuit in order to compensate high frequency increases. 5C4 is used to reduce high frequency negative feedback in order to compensate high frequency echo.

3. When the RC video signal amplification circuit is added for amplification, this waveform will change as shown in Figure 3-12 (a). Without the DC component, as shown in Figure 3-12 (b), the DC level of darker and brighter displays will be different, so when this kind of signal without a DC component is sent to the CRT, it will cause the contrast of the image to change as the signal changes. Therefore, pin 26 and pin 24 of ICB serve as a DC clamp and the CRT's anode DC voltage can be adjusted by 5V2.

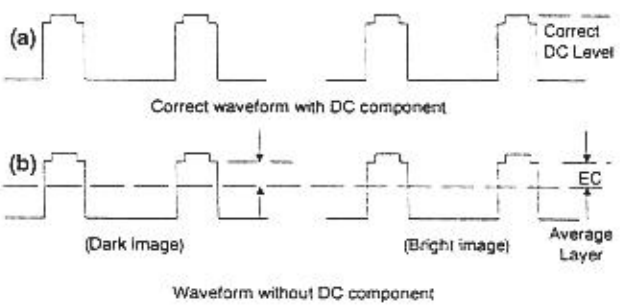


Figure 3-12 Affect of DC Component on Waveform

Section 4.
Setup Adjustments

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4.1. Preparing the Display for Adjustment

Before adjusting any display settings or making final adjustments after service, perform the following pre-test settings to prepare the display for adjustment:

1. Be sure to allow the display to warm up for at least 30 minutes before making any adjustments.
2. When making tests and adjustments, the CRT should be facing east or west to minimize the affect of the earth's magnetic field.
3. Set the contrast control at 80% and the brightness control at 50% for all tests unless otherwise specified.
4. Thoroughly degauss the entire screen with a manual degausser before proceeding with the tests.
5. All tests should be performed with the rated power supply voltage unless otherwise specified.
6. Before the alignment procedure, turn the external control VRs to detent position.

4.1.1. Test Equipment Required

The following equipment will be required to make the tests and adjustments detailed in this section:

- ☐ Video signal and pattern generator
- ☐ Digital multimeter
- ☐ Degausser

4.2. Adjustment Procedures

4.2.1. Adjustment Sequence

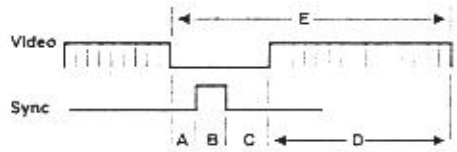
This display undergoes an automatic alignement procedure during manufacture. This alignment procedure follows a fixed sequence of adjustments which are dupplicated in this section. When making manual adjustments during service, you should always make the adjustments in the order given here to ensure correct results.

4.2.2. Preset Timings Used During Adjustment

The timings required to be input during alignment consist mostly of the preset timings stored in the display, but five non-preset timings are required for free run adjustment (Mode 7-9) and for testing specifications (Mode 10-11). The complete list of six preset timings and five non-preset timings for use in alignment is shown in the table below.

IMPORTANT NOTE

The preset timings for different versions of this model may differ from those shown here. Be sure to check the list of preset timings for the unit being serviced.



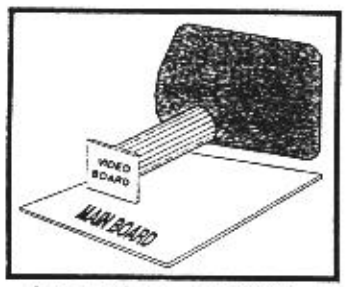
Mode Number	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6	Mode 7
Data Pixel	1024	1024	800	800	640	640	1024
Data Line	768	768	600	600	480	480	768
H. Freq.(kHz)	60.023	48.363	46.875	37.879	37.500	31.469	56.476
V. Freq(Hz)	75.029	60.004	75.000	60.317	75.000	59.942	70.070
Pixel Rate(MHz)	78.750	65.000	49.500	40.000	31.500	25.176	75.000
Hor. FP μs(A)	0.203	0.369	0.323	1.000	0.508	0.636	0.320
Hor. Sync μs(B)	1.219	2.092	1.616	3.200	2.032	3.813	1.813
Hor. BP μs(C)	2.235	2.462	3.232	2.200	3.810	1.907	1.920
Hor. Active μs(D)	13.003	15.754	16.162	20.000	20.317	25.422	13.653
Hor. Total μs(E)	16.660	20.677	21.333	26.400	26.667	31.778	17.707
Ver. FP ms(A)	0.017	0.062	0.021	0.026	0.027	0.318	0.053
Ver. Sync ms(B)	0.050	0.124	0.064	0.106	0.080	0.064	0.106
Ver. BP ms(C)	0.466	0.600	0.448	0.607	0.427	1.048	0.513
Ver. Active ms(D)	12.795	15.880	12.800	15.840	12.800	15.253	13.599
Ver. Total ms(E)	13.328	16.666	13.333	16.579	13.333	16.683	14.272
Polarity(H.V)	+,+	-,-	+,+	+,+	-,-	-,-	-,-
Test Mode			Primary				H-free run test adjust

Table 4-1-1 Table of preset Timing Parameters

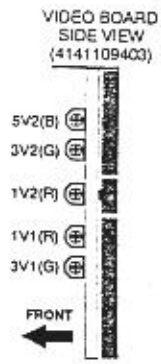
Mode Number	Mode 8	Mode 9	Mode 10	Mode 11
Data Pixel	800	1024	800	1024
Data Line	600	768	600	768
H. Freq.(kHz)	35.156	35.520	48.077	56.476
V. Freq(Hz)	56.250	43.480	72.188	70.070
Pixel Rate(MHz)	36.000	44.900	50.000	75.000
Hor. FP μs(A)	0.667	0.178	1.120	0.320
Hor. Sync μs(B)	2.000	3.920	2.400	1.813
Hor. BP μs(C)	3.556	1.247	1.280	1.920
Hor. Active μs(D)	22.222	22.810	16.000	13.653
Hor. Total μs(E)	28.444	28.150	20.800	17.707
Ver. FP ms(A)	0.028	0.014e / 0.000o	0.770	0.053
Ver. Sync ms(B)	0.057	0.113	0.125	0.106
Ver. BP ms(C)	0.626	0.577e / 0.563o	0.478	0.513
Ver. Active ms(D)	17.067	10.810	12.480	13.599
Ver. Total ms(E)	17.778	11.513e / 11.485o	13.853	14.272
Polarity(H.V)	+,+	+,+	+,+	-,-
Test Mode	V-free run test adjust	V-free run test adjust	Timing check	Timing check

Table 4-1-2 Table of preset Timing Parameters

4.3. Location of Adjustment VRs



Location of PCBs



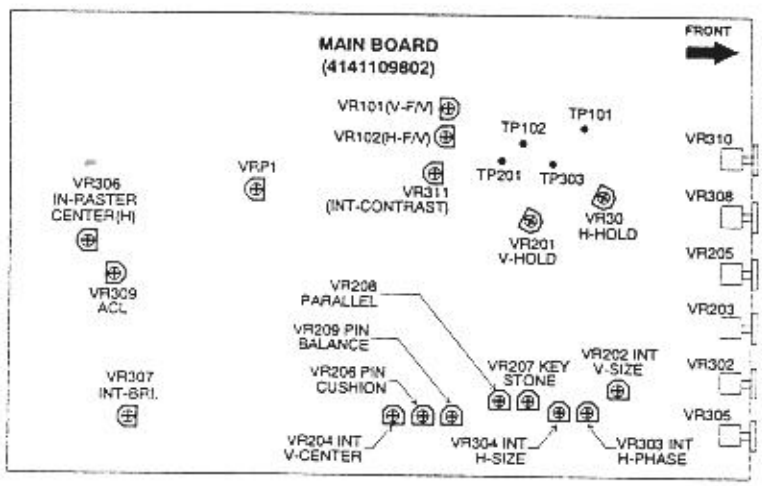


Figure4-1 Location of Mainboard

4.3.1. Key to Adjustment VRs

Main Board	
Number	Function
VR101	V-F/V adj.
VR102	H-F/V adj.
VR201	Internal V-hold adj.
VR202	Internal V-size adj.
VR204	Internal V-center adj.
VR206	Pincushion adj.
VR207	Key stone adj.
VR208	Parallel adj.
VR209	Pin-Balance adj.
VR301	Internal H-hold adj.
VR303	Internal H-phase adj.
VR304	Internal H-size adj.
VR306	Int- Raster center adj.(H)
VR307	Int- Brightness adj.
VR309	A.C.L. adjustment
VR311	Int-Contrast adj.
VRP1	Hight voltage adj.
TP101	Vertical jump test point
TP102	Horizontal jump test point
TP201	Vertical F/V test point
TP303	Horizontal F/V test point
External Controls	
VR203	Vertical size adj.
VR205	Vertical position adj.
VR302	Horizontal position adj.
VR305	Horizontal size adj.
VR308	Brightness adj.
VR310	Contrast adj.

Video Board	
Number	Function
VR1V2	R(ed) cut off adj.
VR3V2	G(reen) cut off adj.
VR5V2	B(lue) cut off adj.
VR3V1	G(reen) driver adj.
VR1V1	R(ed) driver adj.

Please follow the detailed instructions for alignment adjustment given below in the order they appear.

IMPORTANT NOTE

The adjusment settings in this section are based on REVISION A of the factory alignment procedures. Appendices detailing changes in the factory alignment procedures that have occurred since publication of this service manual are available upon request.

4.4. HV, G1 Voltage Setting

1. Input the cross hatch pattern in 46.875kHz (800x600) mode and set external brightness VR308 to maximum. Adjust VRP1 until a high voltage value of 24±0.2kV is obtained.
2. Adjust VR307 until the G1 voltage is -50V±0.5V.

4.5. Pre-Brightness and Focus Setting

1. Turn external brightness VR308 and contrast VR310 to maximum and adjust G2 until background brightness is just visible (approx. 1FL).
2. Adjust the G4 VR until the on-screen characters are clear.
3. Adjust the VR309 counterclockwise to the end.

4.6. Horizontal and Vertical F/V Hold Setting

1. Input the cross hatch pattern in 56.47kHz (1024x768) mode. Use a jump wire connected to test point TP102 and ground. Adjust VR102 to get the picture upright.
2. Input the cross hatch pattern in 31.469kHz (640x480) mode. Connect a jumper wire from TP102 to ground and adjust VR301 until the display is correctly positioned.
3. Input the cross hatch pattern in 35.52kHz (1024x768) mode. Connect a jumper wire from TP101 to ground and adjust VR101. The correct Vertical frequency is 80Hz±0.5.
4. Input the cross hatch pattern in 35.16kHz (800x600) mode. Connect a jumper wire from TP101 to ground and adjust VR201. The correct vertical frequency is 52Hz±0.5.
5. Check every preset mode to verify a correct display.

4.7. Image Centering Adjustment

1. Input a full white pattern in 46.875kHz (800x600) mode and adjust VR204 (vertical center adjustment) to center the screen image in the bezel.
2. Input a full white pattern in 60.023kHz (1024x768) mode and adjust VR306(horizontal center adjustment) to center the screen image in the bezel.

4.8. Image Distortion Adjustment

Input a full white pattern in 46.875kHz (800x600) mode. Use VR206 (pincushion adjustment control) and VR207 (keystone adjustment control) and VR208 (parallel adjustment control) to reduce distortion to a minimum. Check pincushion distortion in each mode, with maximum allowable top/bottom distortion being 2mm and left/right distortion 2.0mm. Verify distortion for all preset modes.

4.9. Height and width and Horizontal Phase Adjustment

1. Input the full white pattern in 46.875kHz (800x600) primary mode. Adjust the VRs as shown in the table below to obtain the correct vertical and horizontal image size and horizontal phase.
   V=195mm±1 H=260mm±1 |L-R| ≤1mm

H-Freq	Resolution	H-size	V-size	H-phase
46.875kHz	800x600	VR304	VR202	VR303

2. Verify that the other preset mode of the vertical and Horizontal image size and horizontal phase shall be in specification.
   V=195mm±4 H=260mm±4 |L-R| ≤4mm

4.10. White Balance Adjustment and Brightness Setting

1. Input a 2" square pattern in 46.8kHz (800x600) mode and set the external brightness control and external contrast at maximum. Set VR1V2 (red Vdc), VR3V2 (green Vdc), VR1V1 (red gain) and VR3V1 (green gain) to the central position. Adjust VR319 so the blue gain is 38Vp-p, and adjust VR5V2 so the B+ cathode is 65VDC.
2. Input a raster mode at 46.8kHz (800x600), set external brightness VR308 and contrast VR310 at maximum and adjust G2 to obtain a brightness of 1.5FL±0.1. Then again turn the external brightness VR308 to the detent position.
3. Input a full white pattern in 46.875kHz mode. Adjust external contrast VR310 to 2FL and adjust brightness VR308 to the detent position (brightness=0.08FL). Adjust VR3V2 so the Y line is 0.298±0.01, and adjust VR1V2 so the X line is 0.283±0.01.
4. Turn external contrast VR310 to maximum and adjust VR3V1 so the Y line is 0.298±0.01, and adjust VR1V1 so the X line is 0.283±0.01.
5. Repeat steps 2-4 above, until the correct value for G2 background brightness is achieved.
6. Input a raster pattern in 46.875kHz (800x600) mode and set external brightness VR308 at maximum. Use a UDT351 light meter directed at the center of the screen and adjust G2 until a background Brightness of 1.5FL±0.2 is obtained.
7. Input a full white pattern and set the external brightness VR308 at detent and external contrast VR310 at maximum. Adjust VR311 so the brightness is 33FL±1 and then set the external brightness VR308 at maximum. Adjust VR309 so the A.C.L is completely white with brightness at 32 FL±1.
8. Change the pattern to 2" square pattern check at the center of the screen brightness shall be less than 40FL.

4.11. Focu s Adjustment

1. Input a full white pattern in 60.023kHz (1024x768) mode. Set external brightness VR308 in the detent position and external contrast at 29FL.
2. Switch the screen pattern to a @ test pattern, and adjust the G4 VR until the clearest possible display is obtained.

4.12. Misconvergence Adjustment

1. Input a full white pattern in 46.875kHz (800x600) mode. Adjust external brightness VR308 in the detent position and external contrast VR310 to 29FL.
2. Switch to a cross hatch pattern and check that the misconvergence within a circle with a radius of 195 mm from the center of the screen is not greater than 0.3mm. For all areas outside the above specified area, the value should not exceed 0.4mm. This specification applies to all modes.
3. If the readings are not within these limits, it will be necessary to adjust the magnetic strips or the 4-pole and 6-pole magents on the CRT neck.

   Note that the G4 and G2 VRs, magnetic strips and 4-pole and 6-pole magnets should be set in place with adhesive after any adjustment has been made.

4.13. Tilt Verification

Input a cross hatch pattern in 46.875kHz 800x600 mode and check that tilt does not exceed 1.75mm . If not within this limit, it may be necessary to adjust the mounting of the CRT in the bezel.

4.14. Horizontal and Vertical Image Size Verification

1. Input the full white pattern in 46.875kHz (800x600) primary mode. Turn external brightness VR308 to the detent position and external contrast VR310 to 29FL.
2. The horizontal and vertical image size of the primary mode should be within H=260mm±2 V=195mm±2. If it is not, then adjust VR304 (Horizontal size) and VR202 (Vertical size).
3. The horizontal and vertical image size of the other preset mode should be within H=260mm±4 V=195mm±4.

4.15. Horizontal and Vertical Center Verification

1. Input a raster pattern in 60.023kHz (1024x768) mode. Turn the external brightness VR308 and contrast VR310 to the maximum and check the raster if it is horizontally center. If it is not, adjust VR306.

2. Input a full white pattern in 46.4875kHz (800x600) primary mode. Turn the external brightness VR308 to the detent position and external contrast VR310 to the maximum. The screen image should be vertically center. If it is not, adjust VR204.

4.16. Horizontal Phase Verification

1. Input a full white pattern in 46.875kHz (800x600) primary mode. Turn external brightness VR308 to the detent position and external contrast VR310 to the maximum. Verify the horizontal center;the screen image in the bezel shall be within $|L\text{-}R| \leq 2mm$.
   If it is not, adjust VR303.

2. Input each preset mode to check whether horizontal phase is within $|L\text{-}R| \leq 4mm$.

4.17. Regulation Verification

Input any preset timing and set external brightness VR308 at detent and turn contrast VR310 from 5 to 25FL. Verify that the horizontal and vertical size does not vary by more than 2mm.

4.18. Horizontal and Vertical Linearity Verification

1. Input each timing mode to check whether horizontal linearity is within 10%. The formula for calculating this is as follow (based on an 8x10 cross hatch test pattern)
   $$\frac{Max-Min}{Max} \times 100\% \leq 10\%$$

2. Input each timing mode to check whether vertical linearity is within 7.5%. The formula for calculating this is as follow (based on an 8x10 cross hatch test pattern).
   $$\frac{Max-Min}{Max} \times 100\% \leq 7.5\%$$

4.19. Brightness Verification

1. Input a raster pattern in 46.875kHz (800x600) primary mode, and set external brightness VR308 and external contrast VR310 at maximum. Verify that the background brightness is between 1FL to 2.5FL.
   If it is not in this range, adjust G2 VR.

2. Input a full white pattern in 46.875kHz (800x600) primary mode, and set external brightness VR308 at the detent position and external contrast VR310 at maximum, which should give a brightness of ≥30FL. If this reading can't be obtained, then double check the adjustments detailed in number 7 of section 4.10.

4.20. Uniformity Verification

Input a full white pattern in 46.875kHz (800x600) primary mode and adjust external brightness VR308 to the detent position. Adjust external contrast VR310 to achieve a brightness of 29FL and use a Minolta CA-100 Color Analyzer (or equivalent) to check the four corners of the screen. Which should show a reading of not less than 70% of that obtained from the center of the screen.

4.21. External VRs Verification

1. Adjust all external VRs to verify correct operation.

2. Adjust horizontal and vertical size for all preset modes to verify full overscan can be achieved in each mode.

4.22. Hight Voltage Protection Verification

Input a cross hatch pattern in 46.875kHz (800x600) primary mode. Use one resister (10kΩ) in parallel with R346 position. Verify that the X-ray operation.

4.23. Color Purity Verification

Input a full white pattern in 46.875kHz (800x600) primary mode. Set external brightness VR308 to the detent position and external contrast VR310 to 29FL. Use the following visual checks to test the purity of each individual color (R.G.B.).

1. Input the R signal only and no G or B should be visible.

2. Input the G signal only and no R or B should be visible.

3. Input the B signal only and no R or G should be visible.

4.24. Video Noise

Input a cross hatch or full white pattern in 46.875kHz (800x600) primary mode, and make a visual check from a distance of approximately 19 inches from the C.R.T to see whether any fluctuation of the image which may be caused by video noise exists.

4.25. Power Saving Verification

1. Input cross hatch pattern in 46.875kHz (800x600) primary mode.

2. Turn off H-Sync signal, the power indicator LED have to change the emitting color from green to orange, then turn on H-Sync singnal again, the picture shall be visible.

3. Turn off V-Sync signal, the power indicator LED have to change the emitting color from green to orange, then turn on V-Sync singnal again, the picture shall be visible.

4. Turn off H/V-Sync signal, the power indicator LED have to change the emitting color from green to orange, then turn on H/V-Sync signal again, the picture shall be visible.

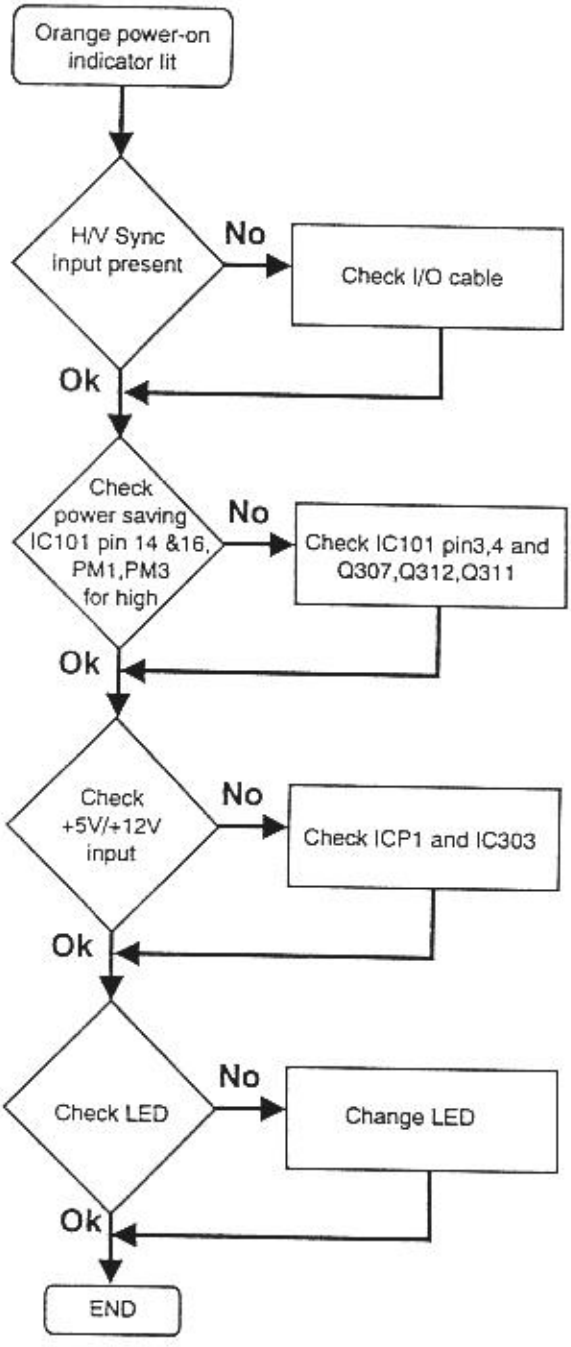
4.26. Man-made Magnetic Field Configuration

Based on customer requirements.

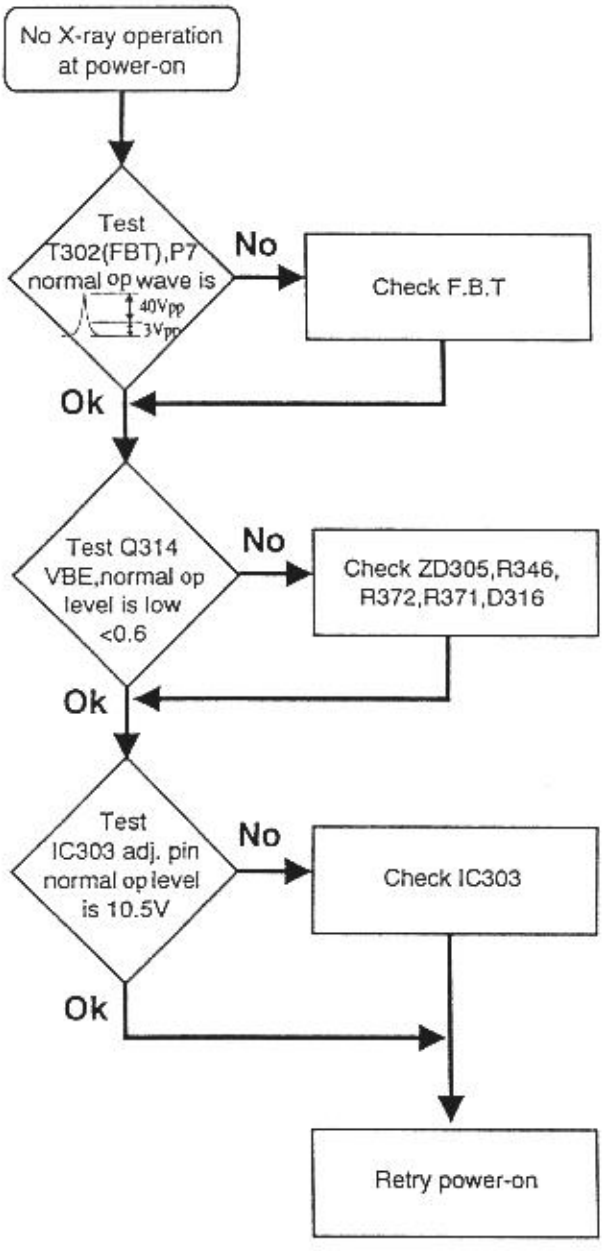
4.27. D.D.C Data Writing

Please see the D.D.C program file.

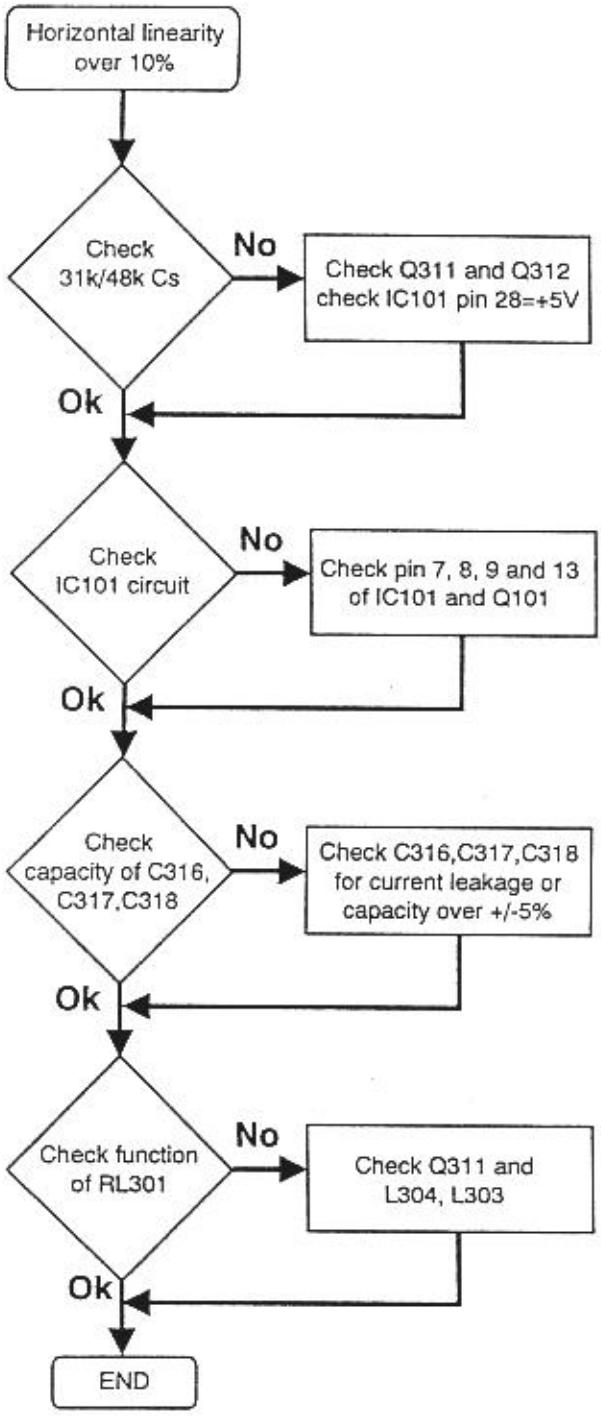
5.1. No Display at Power-on



5.2. No X-ray Operation



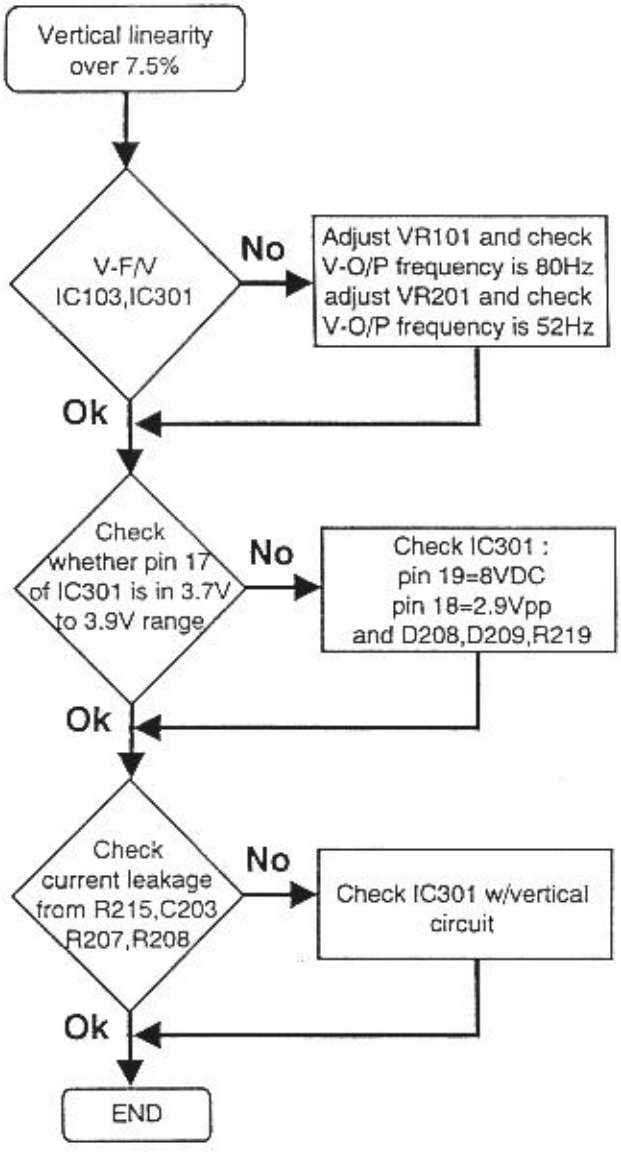
5.3. Poor Horizontal Linearity



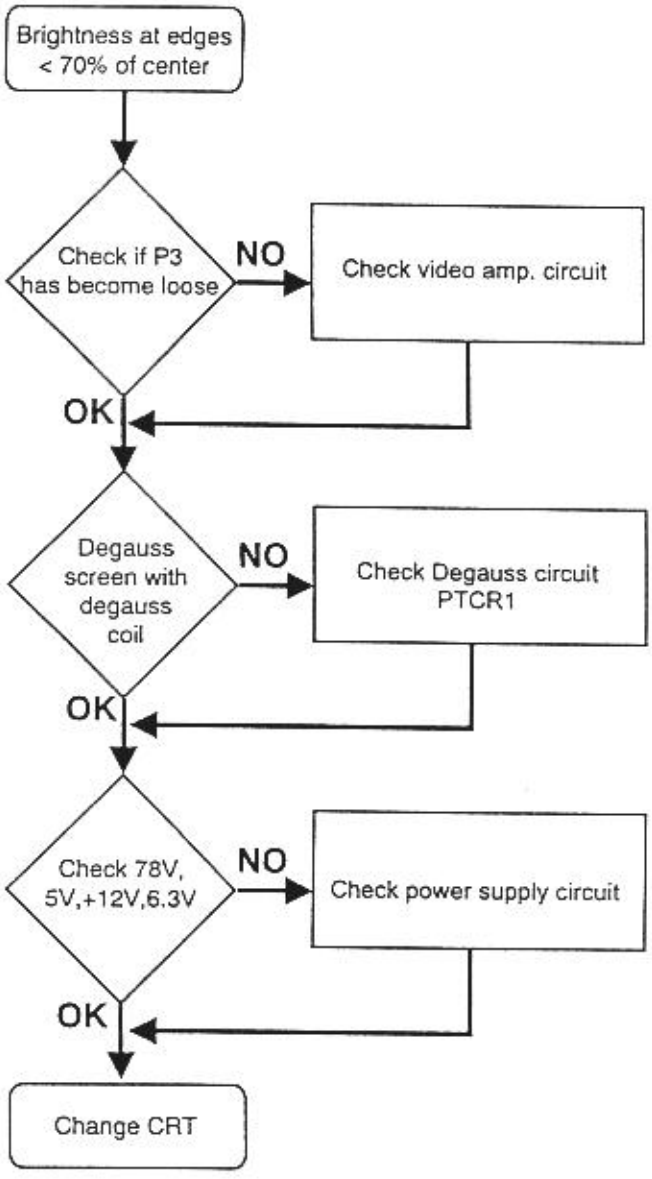
Section 5.
Troubleshooting

5.1. No Display at Power-on 5-1
5.2. No X-ray Operation 5-2
5.3. Poor Horizontal Linearity 5-3
5.4. Poor Vertical Linearity 5-4
5.5. Poor Uniformity 5-5
5.6. Tilted Display Area 5-6
5.7. Misconvergence 5-7
5.8. Video no Display 5-8
5.9. Poor Regulation 5-9

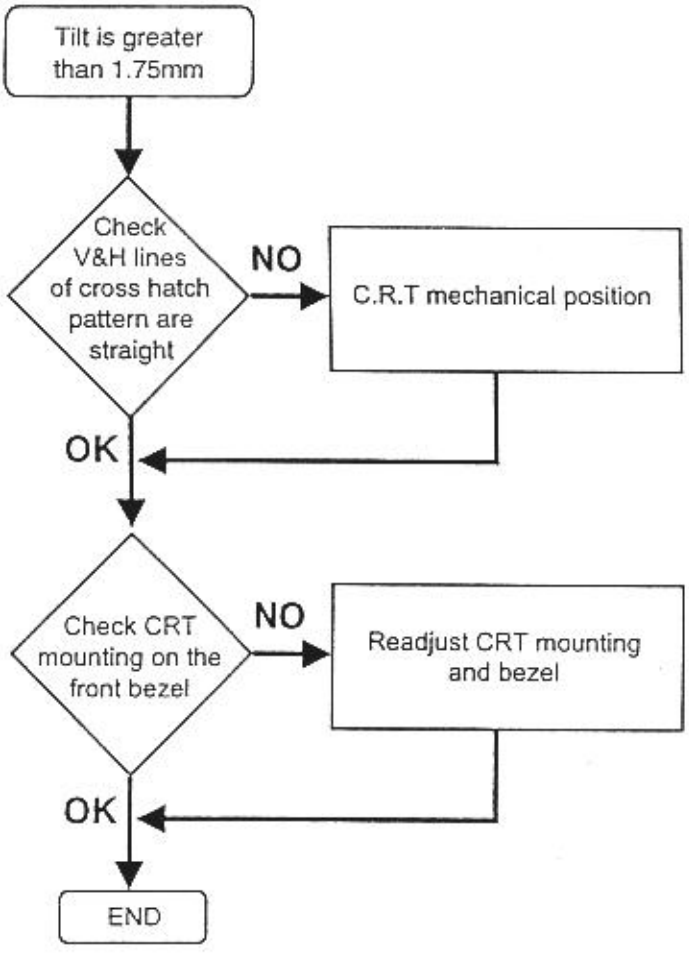
5.4. Poor Vertical Linearity


Vertical linearity over 7.5%
V-F/V IC103,IC301
No
Adjust VR101 and check V-O/P frequency is 80Hz adjust VR201 and check V-O/P frequency is 52Hz
Ok
Check whether pin 17 of IC301 is in 3.7V to 3.9V range
No
Check IC301 : pin 19=8VDC pin 18=2.9Vpp and D208,D209,R219
Ok
Check current leakage from R215,C203 R207,R208
No
Check IC301 w/vertical circuit
Ok
END

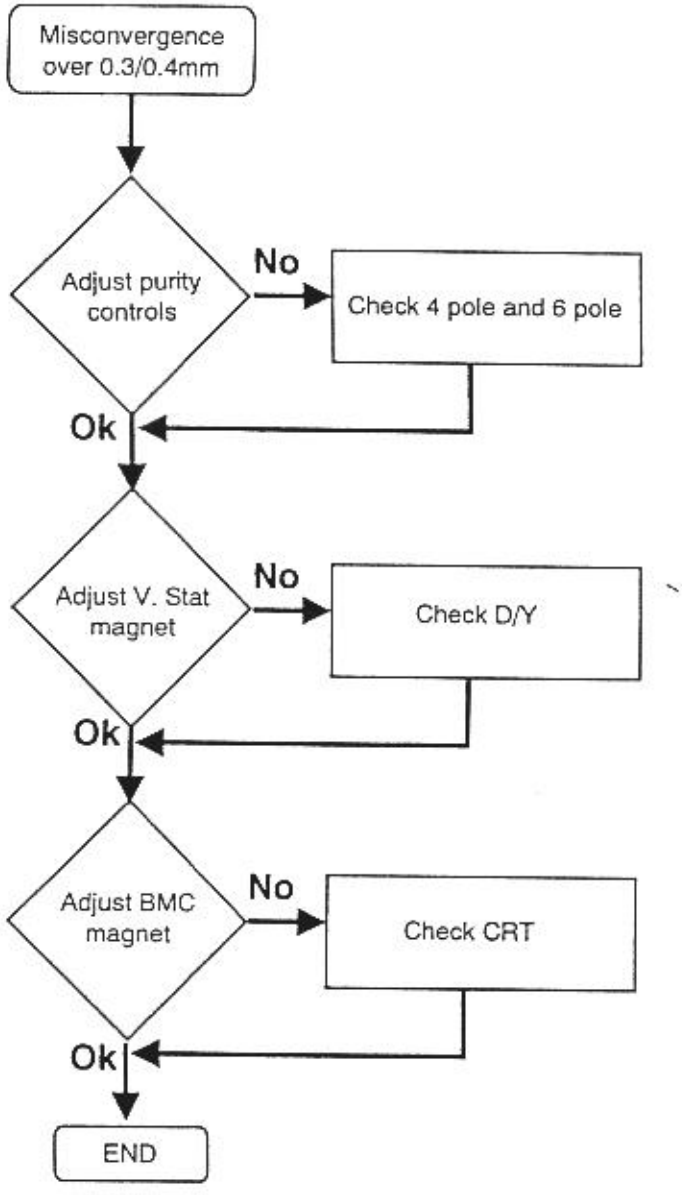
5.5. Poor Uniformity



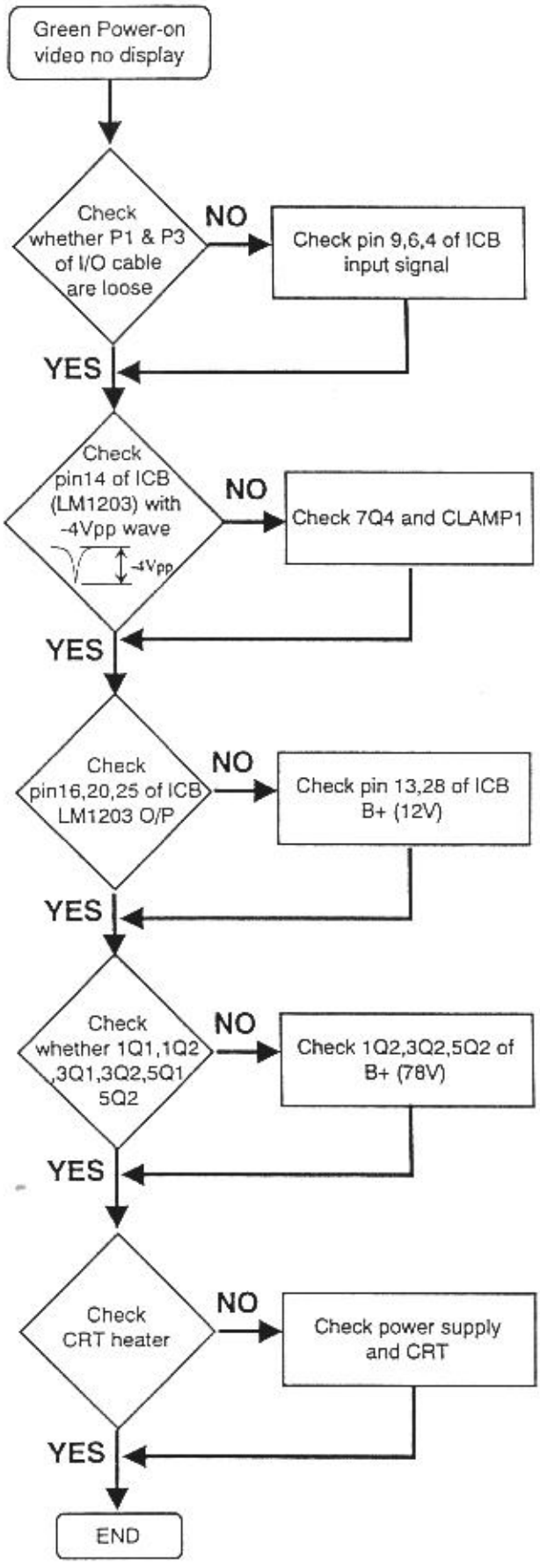
5.6. Tilted Display Area



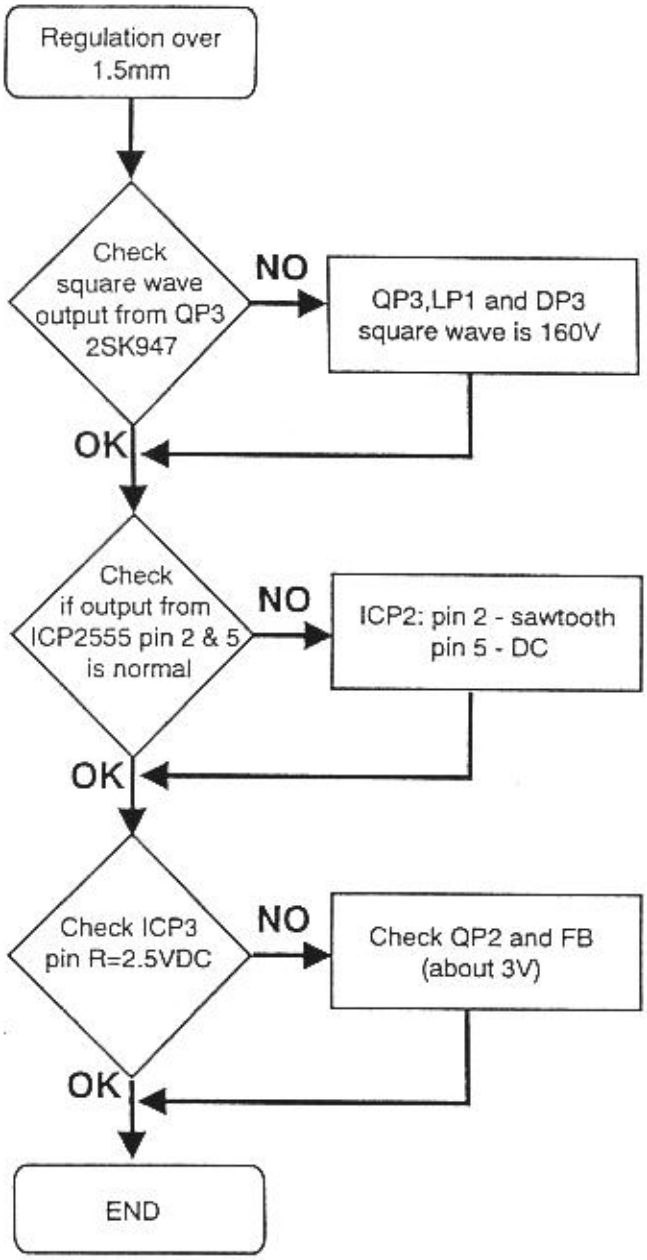
5.7. Misconvergence



5.8. Video no Display



5.9. Poor Regulatdion



Section 6.

Printed Circuit Boards

6.1. Main Board 6-1
6.2. Neck Board 6-2
6.3. PCB Wiring Connection 6-3

6.1. Main Board

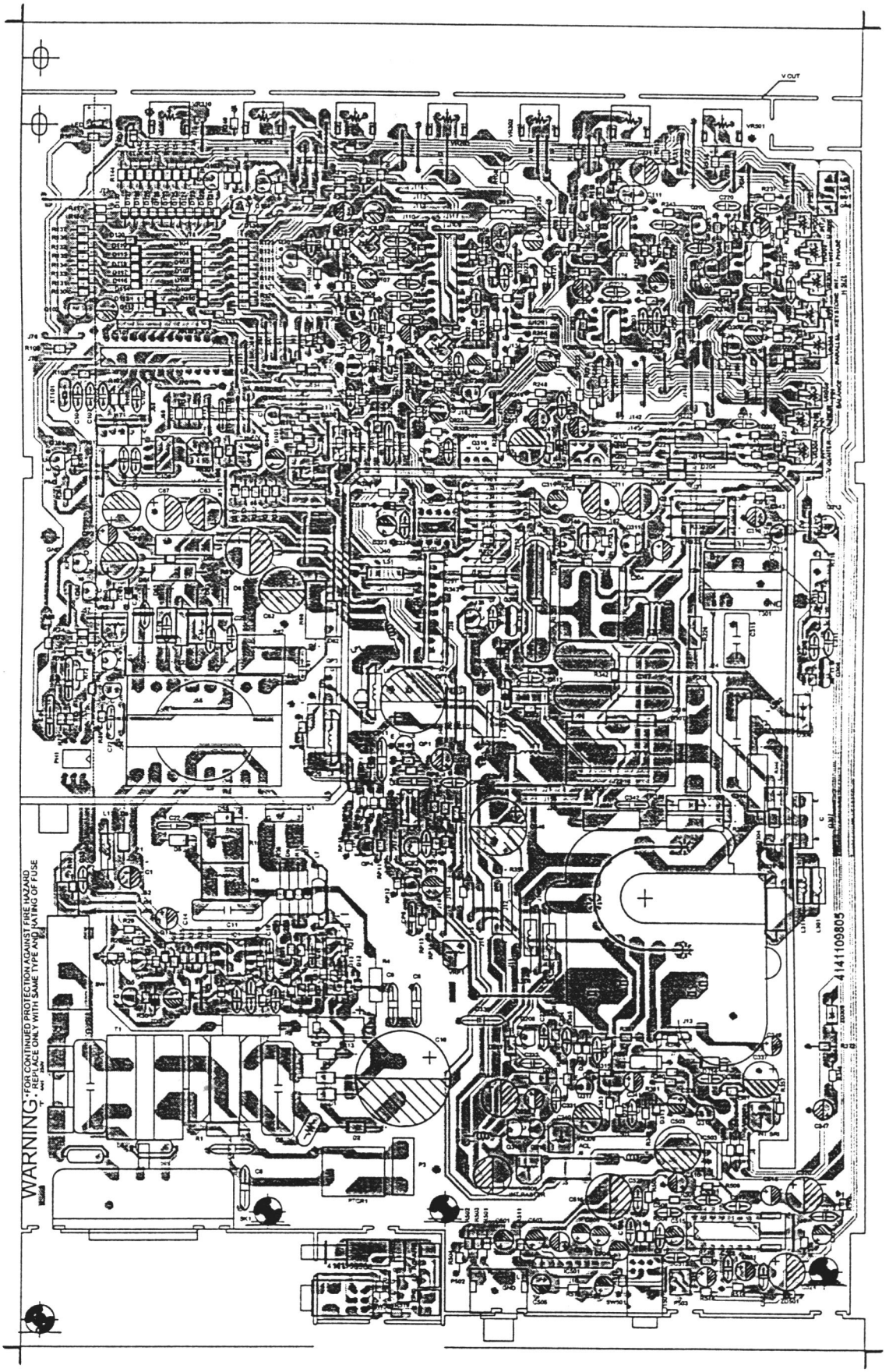


Figure 6-1 Main Board (Solder Side)

6.2. Neck Board

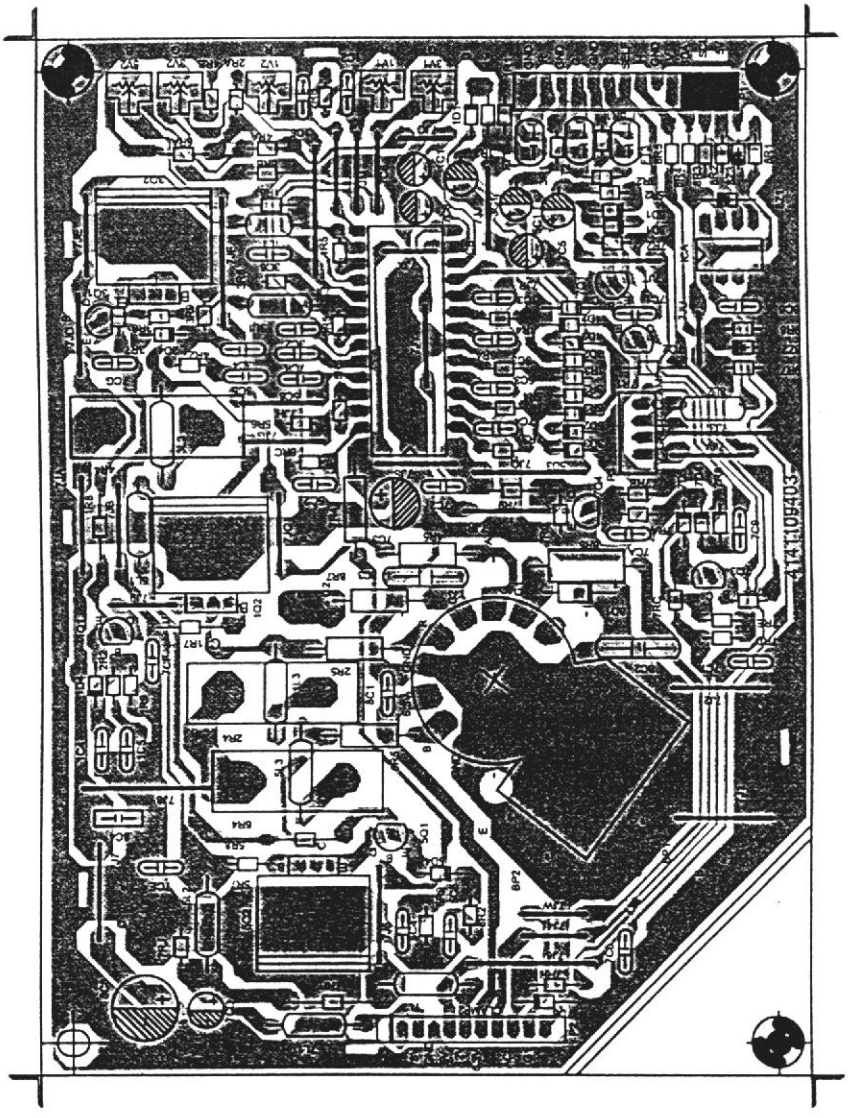


Figure 6-2 Neck Board (Solder Side)

6.3. PCB Wiring Connection

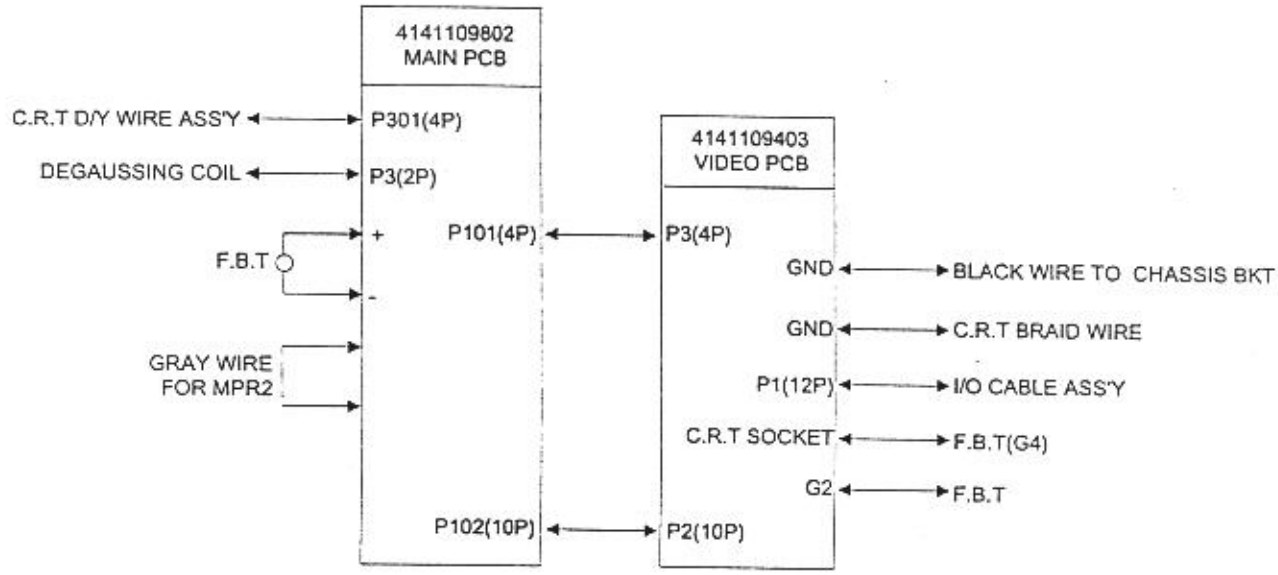


Figure 6-3 PCB Wiring Connection

Section 7.

Schematic Diagrams

7.1. S/P/S Circuit Diagram 7-1
7.2. Neck Circuit Diagram 7-2
7.3. Deflection Circuit Diagram 7-3

7.1. S/P/S Circuit Diagram

Please refer to the attached circuit diagram.

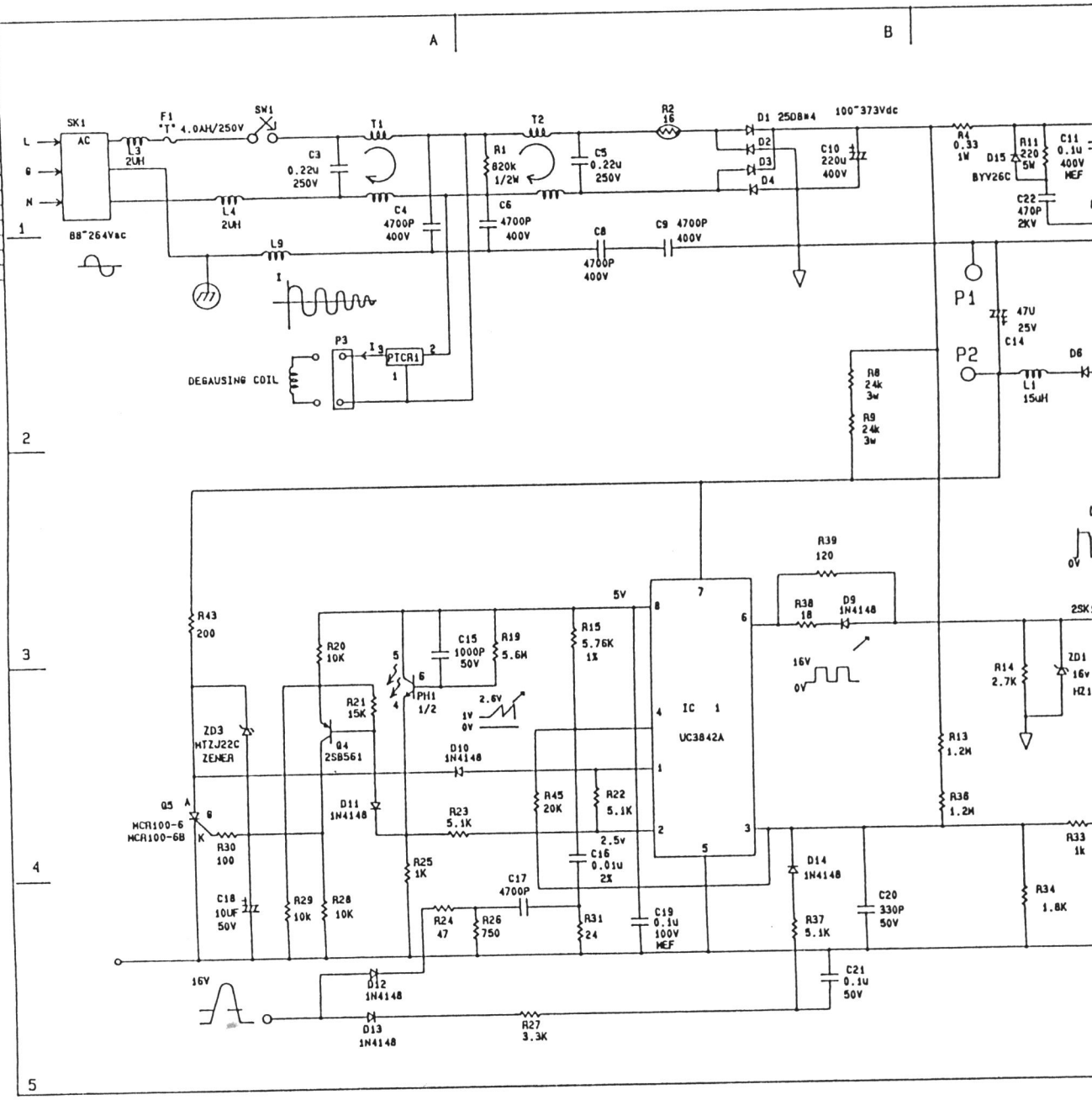
7.2. Neck Circuit Diagram

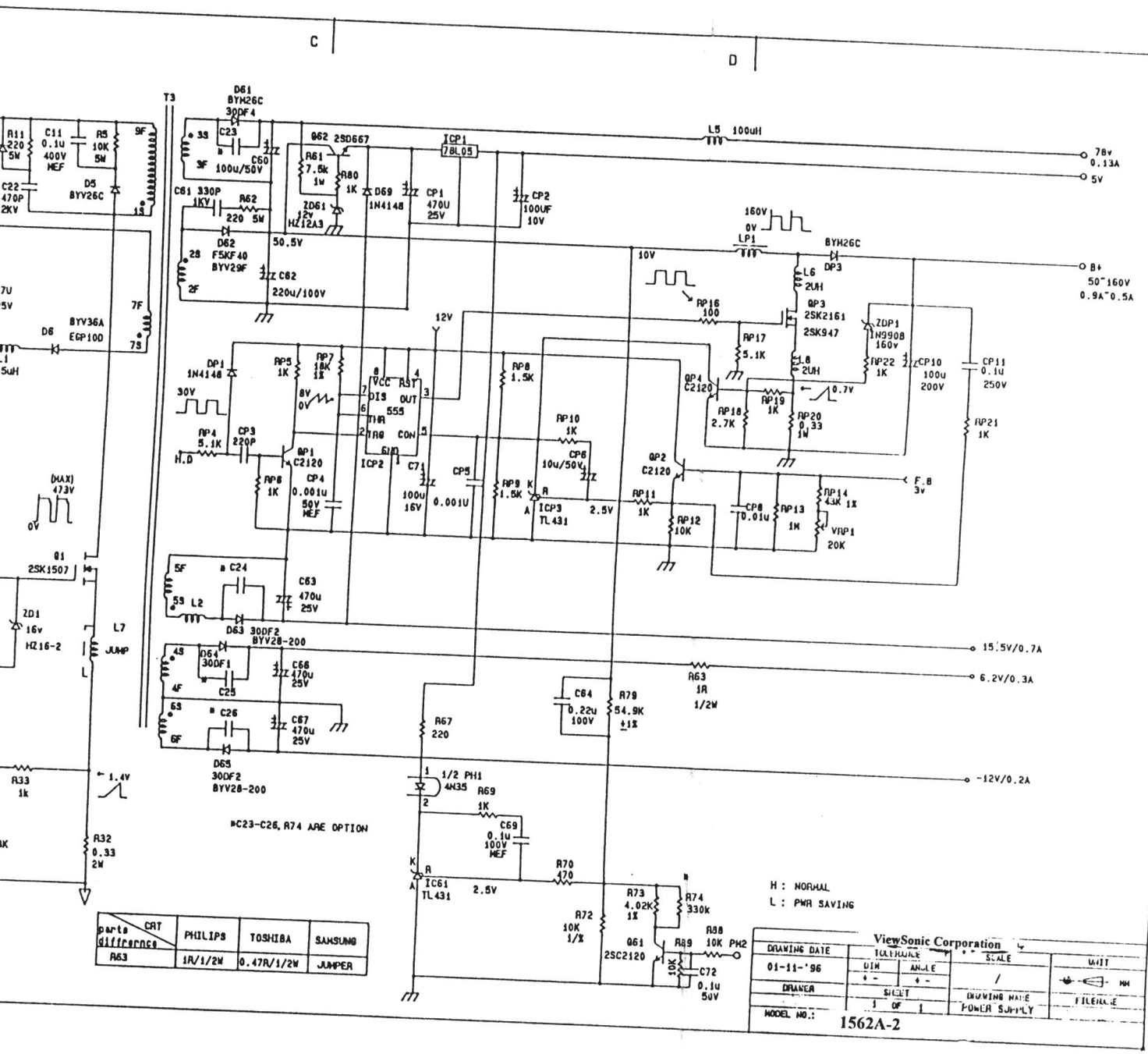
Please refer to the attached circuit diagram.

7.3. Deflection Circuit Diagram

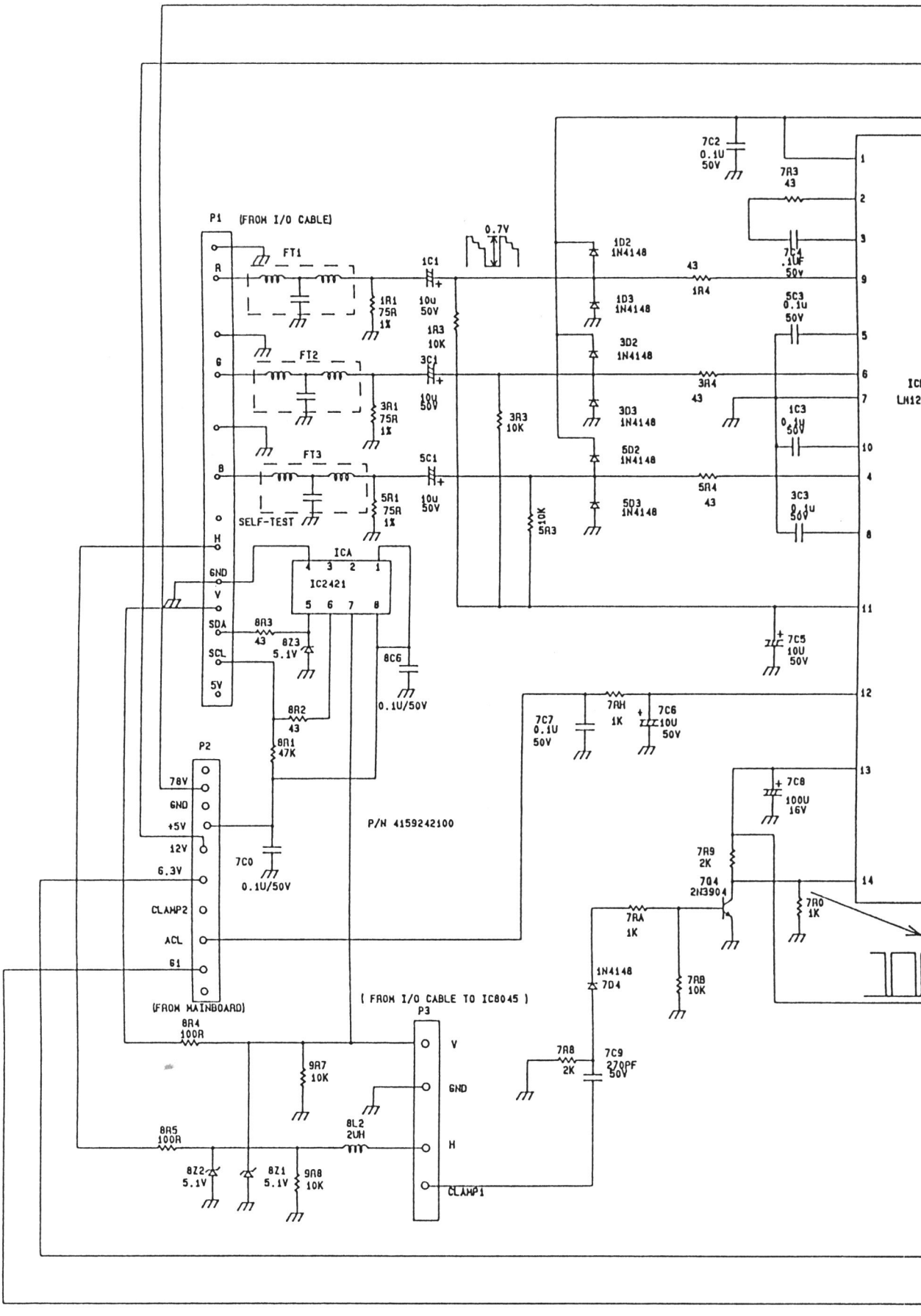
Please refer to the attached circuit diagram.

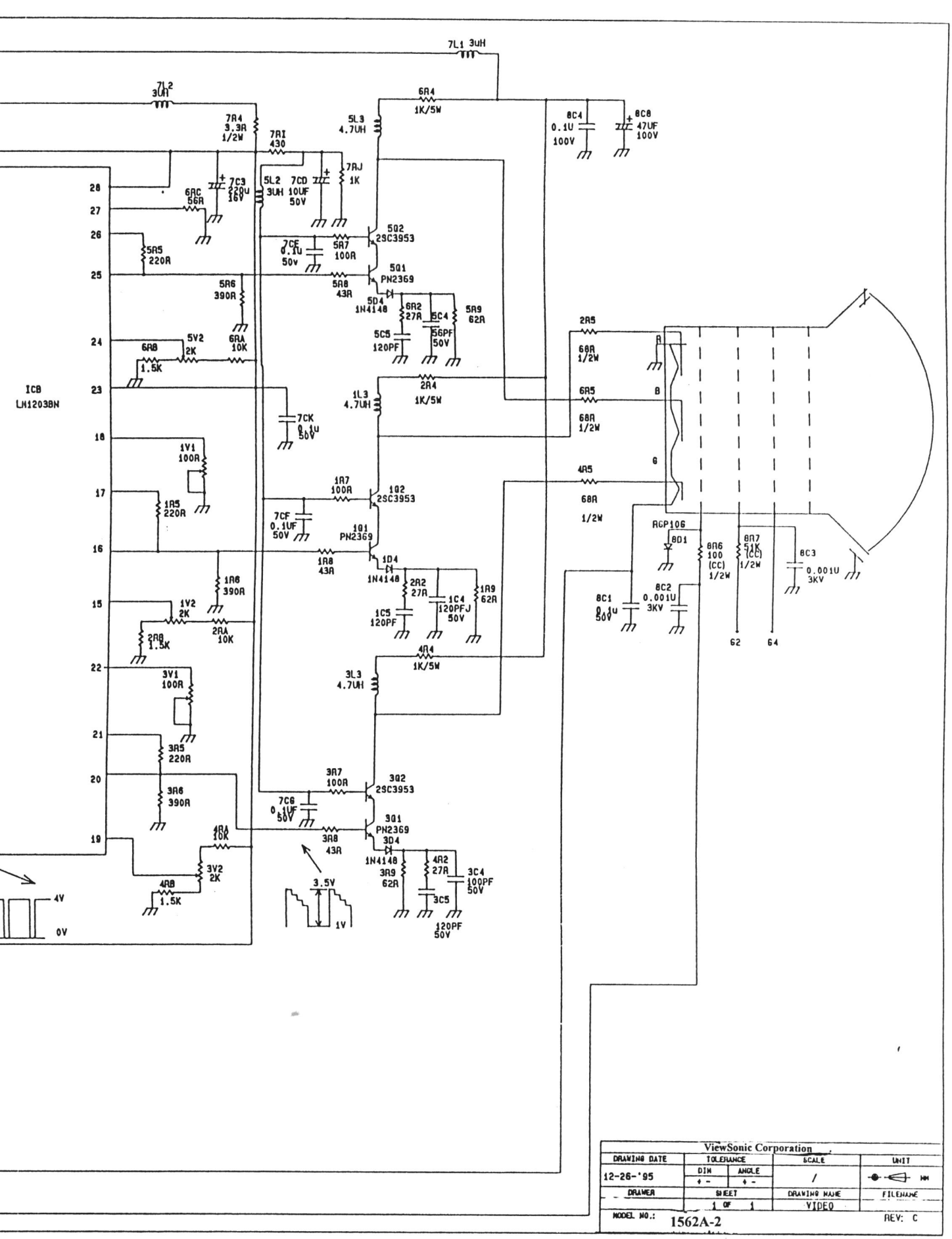
DATE	ECN/ECO NO.
01-11-'95	N-12159509PE




C
D
T3
D61 BYW26C 30DF4
C23
C60 100u/50V
Q62 2SD667
R61 7.5k 1w
R80 1K
ZD61 12v HZ12A3
D69 1N4148
C61 330P 1KV
R62 220 5W
D62 F5KF40 BYV29F
C62 220u/100V
50.5V
ICP1 78L05
CP1 470U 25V
CP2 100UF 10V
L5 100uH
78v 0.13A
5V
160V 0V
LP1
BYW26C
DP3
L6 2UH
8+ 50~160V 0.9A~0.5A
10V
RP16 100
QP3 2SK2161 2SK947
RP17 5.1K
L8 2UH
ZDP1 1N990B 160v
RP22 1K
CP10 100u 200V
CP11 0.1u 250V
RP21 1K
0.7V
QP4 C2120
RP18 2.7K
RP19 1K
RP20 0.33 1W
12V
DP1 1N4148
RP5 1K
RP7 18K 1%
30V
8V 0V
RP4 5.1K
CP3 220P
H.D
QP1 C2120
RP6 1K
CP4 0.001u 50V MEF
ICP2 555
C71 100u 16V
CP5 0.001U
RP8 1.5K
RP10 1K
CP6 10u/50V
ICP3 TL431 2.5V
QP2 C2120
RP11 1K
RP12 10K
CP8 0.01u
RP13 1M
RP14 43K 1%
VRP1 20K
F.B 3v
(MAX) 473V
0V
Q1 2SK1507
ZD1 16v HZ16-2
L7 JUMP
C24
C63 470u 25V
L2
D63 30DF2 BYV28-200
15.5V/0.7A
D64 30DF1
C25
C66 470u 25V
6.2V/0.3A
C26
C67 470u 25V
D65 30DF2 BYV28-200
R63 1R 1/2W
C64 0.22u 100V
R79 54.9K ±1%
R67 220
-12V/0.2A
1.4V
R33 1k
R32 0.33 2W
1/2 PH1 4N35
R69 1K
C69 0.1u 100V MEF
IC61 TL431 2.5V
R70 470
R72 10K 1%
R73 4.02K 1%
R74 330k
Q61 2SC2120
R89 10K
R88 10K PH2
C72 0.1u 50V
*C23-C26, R74 ARE OPTION
H : NORMAL
L : PWR SAVING
parts differences
CRT
PHILIPS
TOSHIBA
SAMSUNG
R63
1R/1/2W
0.47R/1/2W
JUMPER
ViewSonic Corporation
DRAWING DATE
01-11-'96
DRAWER
TOLERANCE
DIM
ANGLE
SCALE
/
UNIT
MM
SHEET
1 OF 1
DRAWING NAME
POWER SUPPLY
FILENAME
MODEL NO.:
1562A-2

DATE	ECN/ECO NO.
2-26-'95	N-11299505PE





ViewSonic Corporation				
DRAWING DATE	TOLERANCE		SCALE	UNIT
12-26-'95	DIM ±	ANGLE ±	/	MM
DRAWER	SHEET		DRAWING NAME	FILENAME
	1 OF 1		VIDEO	
MODEL NO.: 1562A-2				REV: C

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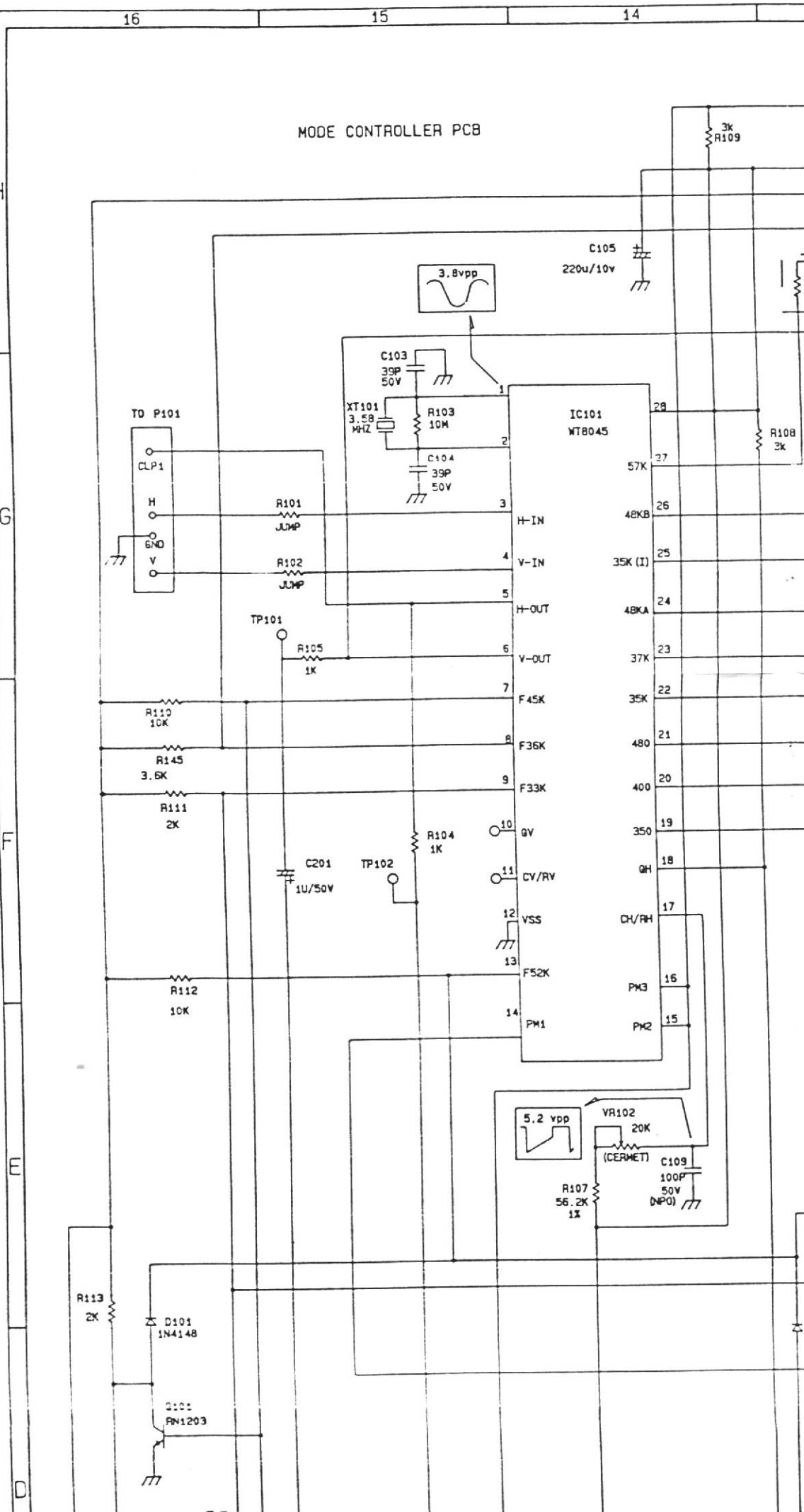
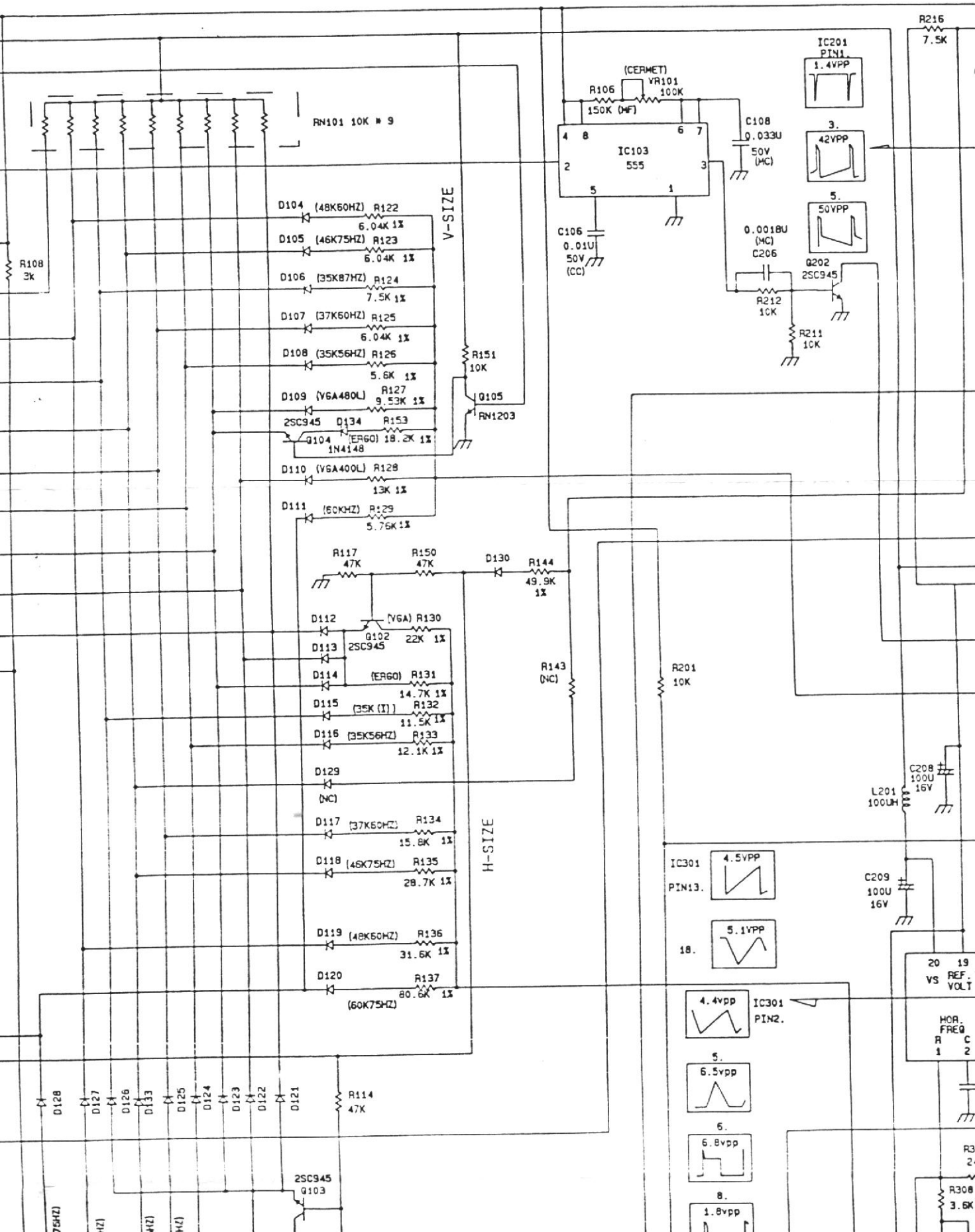
-09-'95	N-09299501EG
-01-'95	O-11159501EQ
-06-'95	N-11179504EG
-06-'95	N-11179503EG
-26-'95	N-11239052PE
-26-'95	N-11229501PE
-11-'96	N-12119501PE
-11-'96	N-12129501PE
-23-'95	N-01039601RG
-01-'96	N-01159604EG
-29-'96	N-01319603PE
-21-'96	N-02229601PE
-21-'96	N-02229602PE
-09-'96	O-013096C1EP
-09-'96	N-02079601PE

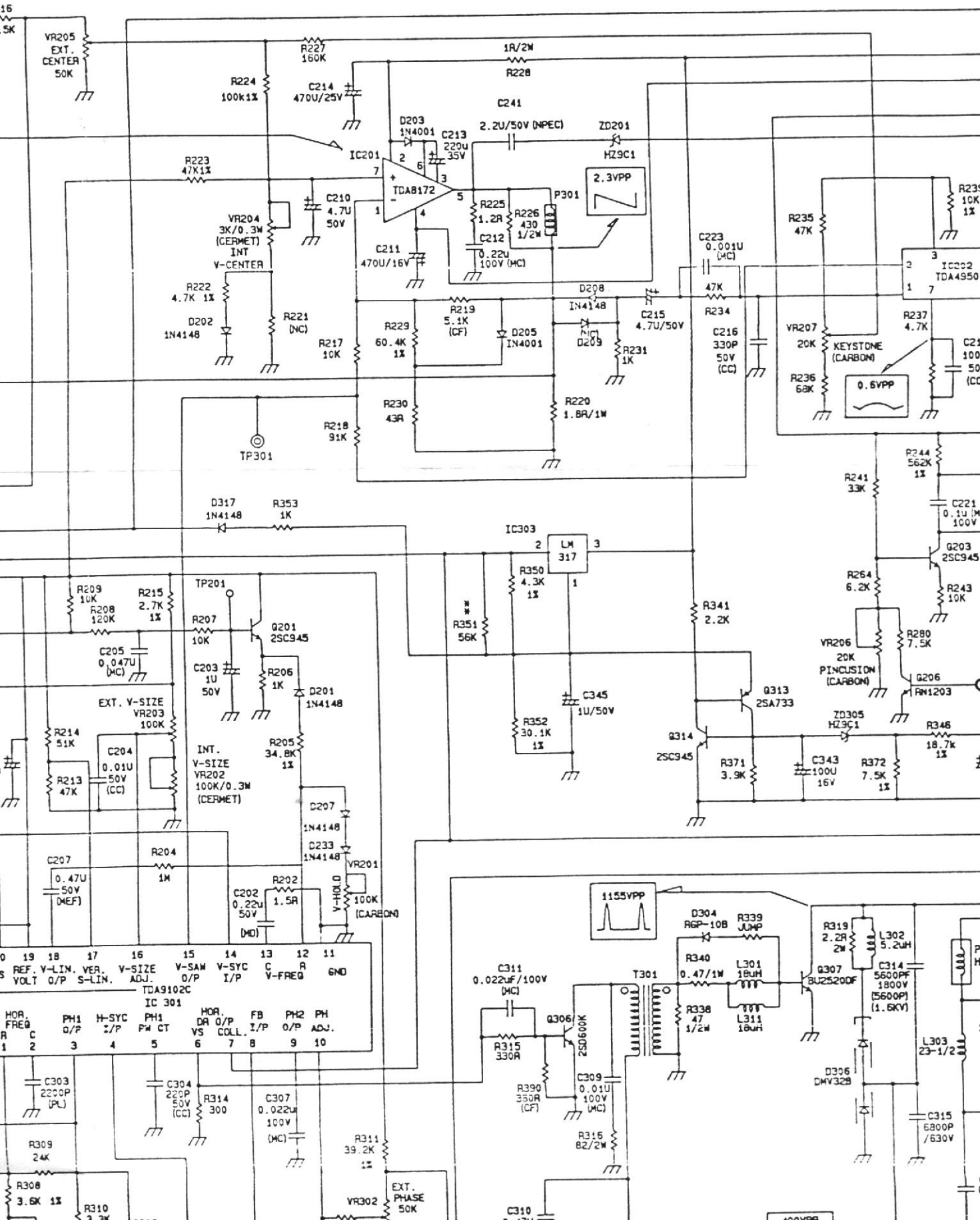


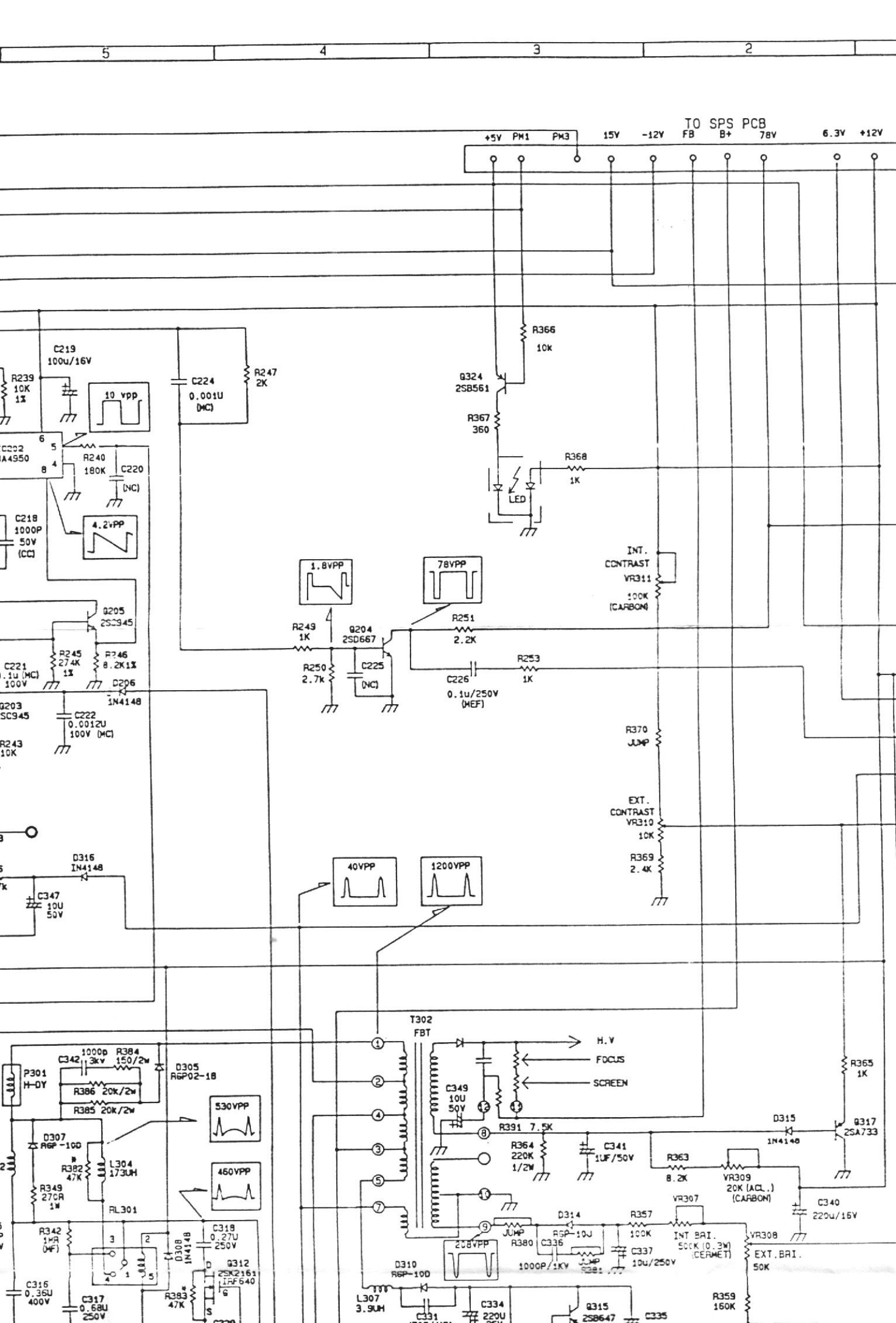

RN101 10K * 9
R108 3k
V-SIZE
D104 (48K60HZ) R122 6.04K 1%
D105 (46K75HZ) R123 6.04K 1%
D106 (35K87HZ) R124 7.5K 1%
D107 (37K60HZ) R125 6.04K 1%
D108 (35K56HZ) R126 5.6K 1%
D109 (VGA480L) R127 9.53K 1%
2SC945 D134 R153
Q104 (ER60) 18.2K 1%
1N4148
D110 (VGA400L) R128 13K 1%
D111 (60KHZ) R129 5.76K 1%
R151 10K
Q105
RN1203
R117 47K
R150 47K
D130
R144 49.9K 1%
D112 (VGA) R130
Q102 2SC945 22K 1%
D113
D114 (ER60) R131 14.7K 1%
D115 (35K(I)) R132 11.5K 1%
D116 (35K56HZ) R133 12.1K 1%
D129 (NC)
D117 (37K60HZ) R134 15.8K 1%
D118 (46K75HZ) R135 28.7K 1%
D119 (48K60HZ) R136 31.6K 1%
D120 R137 80.6K 1%
(60K75HZ)
H-SIZE
R143 (NC)
R201 10K
D128 D127 D126 D133 D125 D124 D123 D122 D121
R114 47K
2SC945 Q103
(CERMET) VR101 100K
R106 150K (MF)
IC103 555
C108 0.033U 50V (MC)
C106 0.01U 50V (CC)
0.0018U (MC) C206
Q202 2SC945
R212 10K
R211 10K
R216 7.5K
IC201 PIN1. 1.4VPP
3. 42VPP
5. 50VPP
C208 100U 16V
L201 100UH
IC301 PIN13. 4.5VPP
18. 5.1VPP
C209 100U 16V
20 19 VS REF. VOLT
4.4vpp IC301 PIN2.
HOR. FREQ
5. 6.5vpp
6. 6.8vpp
8. 1.8vpp
R308 3.6K

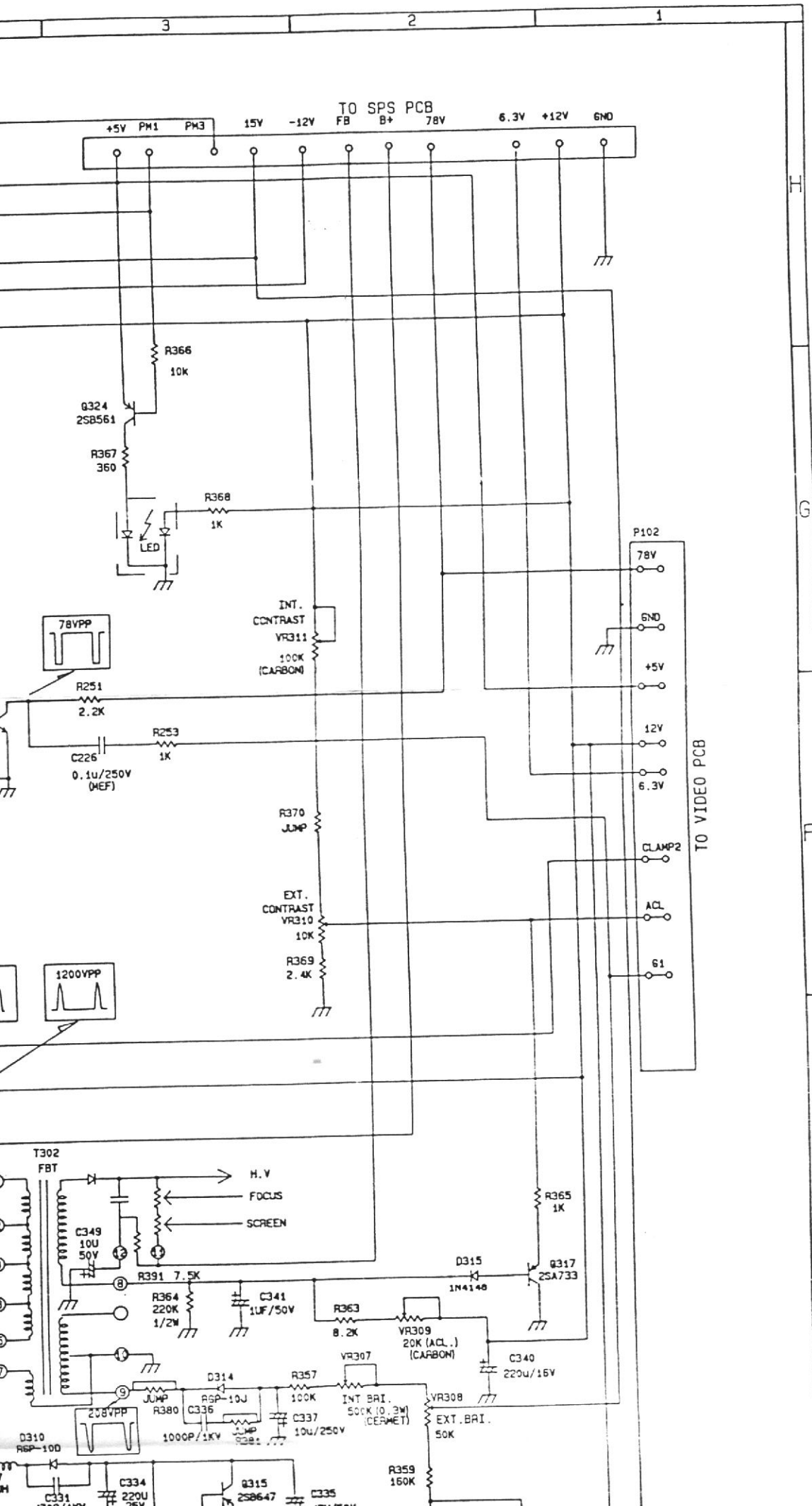
9 | 8 | 7 | 6

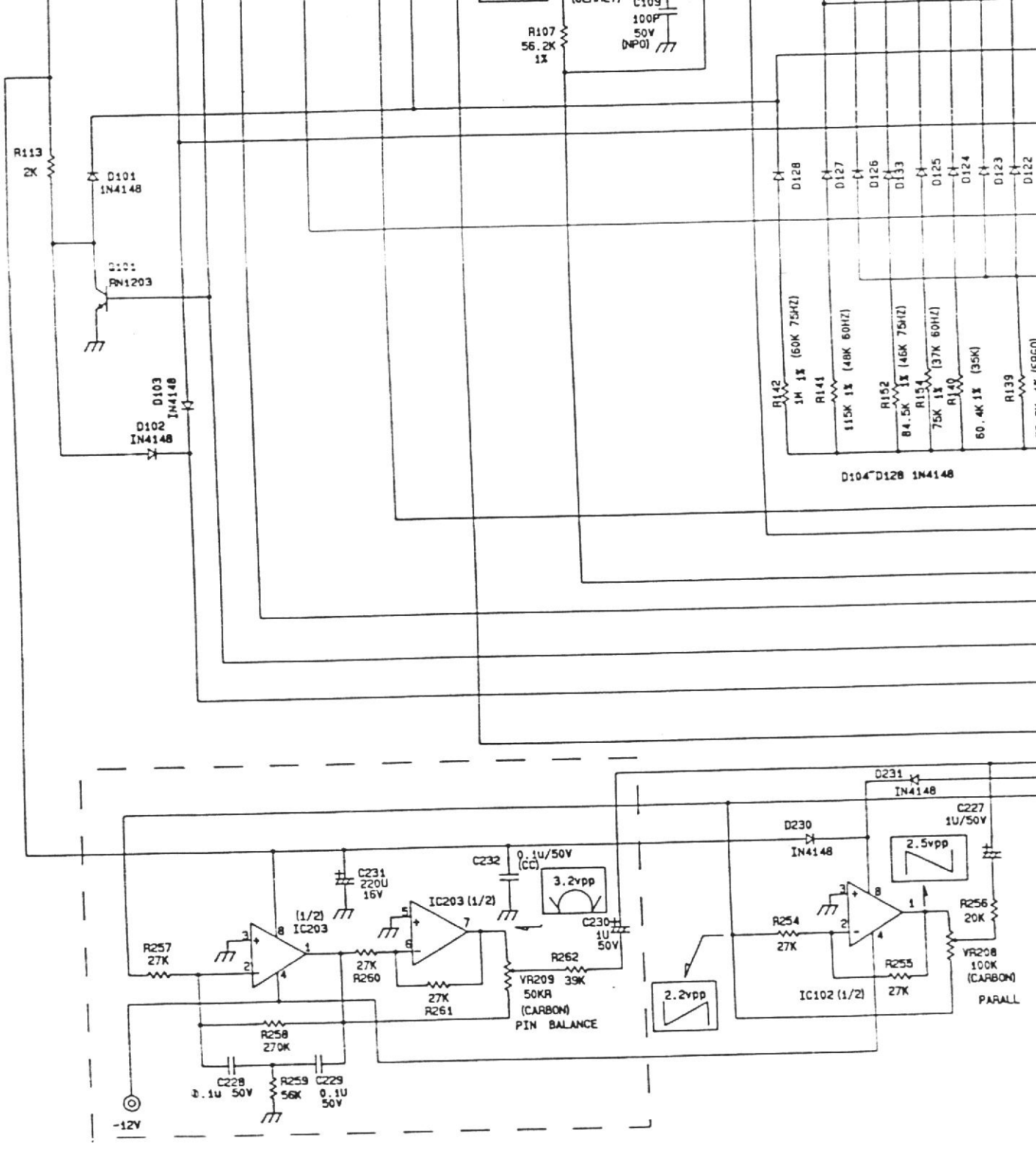
N DEF. PCB

41109803



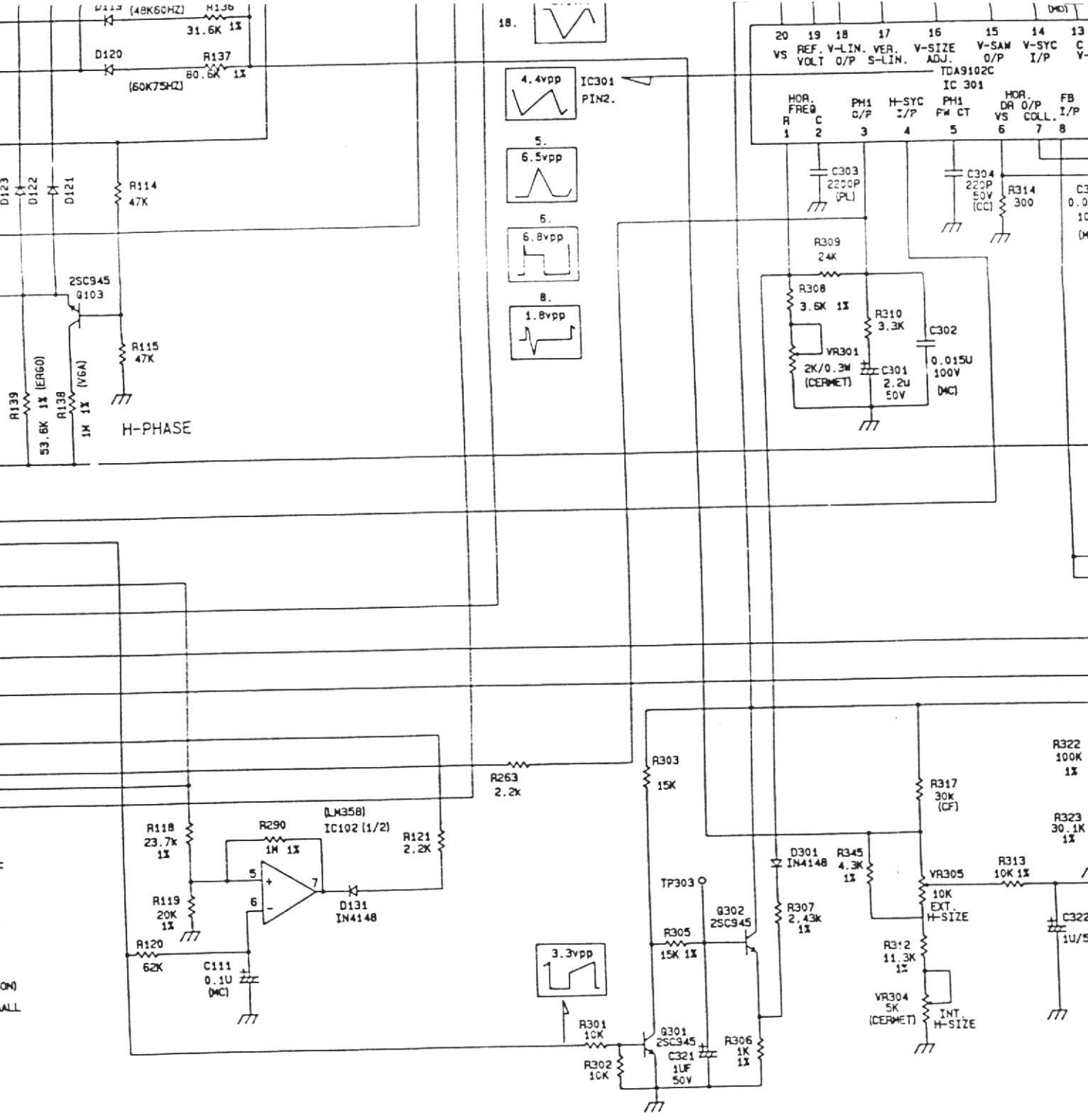

5
4
3
2
TO SPS PCB
+5V
PM1
PM3
15V
-12V
FB
B+
78V
6.3V
+12V
C219
100u/16V
R239
10K
1%
10 vpp
C224
0.001U
(MC)
R247
2K
R366
10k
Q324
2SB561
R367
360
R368
1K
LED
R240
180K
C220
(NC)
4.2vPP
C218
1000P
50V
(CC)
1.8VPP
78VPP
INT.
CONTRAST
VR311
100K
(CARBON)
Q205
2SC945
R249
1K
Q204
2SD667
R251
2.2K
R245
274K
1%
R246
8.2K1%
R250
2.7k
C225
(NC)
R253
1K
C226
0.1u/250V
(MEF)
C221
.1u (MC)
100V
D206
1N4148
Q203
SC945
C222
0.0012U
100V (MC)
R243
10K
R370
JUMP
EXT.
CONTRAST
VR310
10K
R369
2.4K
D316
IN4148
C347
10U
50V
40VPP
1200VPP
T302
FBT
H.V
FOCUS
SCREEN
P301
H-DY
C342
1000p
3kv
R384
150/2w
D305
RGP02-18
R386 20k/2w
R385 20k/2w
530VPP
460VPP
C349
10U
50V
R391 7.5K
R364
220K
1/2W
C341
1UF/50V
D315
1N4148
Q317
2SA733
R365
1K
R363
8.2K
VR309
20K (ACL.)
(CARBON)
C340
220u/16V
VR307
INT BRI.
500K (0.3W)
(CERMET)
VR308
EXT.BRI.
50K
D307
RGP-10D
R382
47K
L304
173UH
R349
270R
1W
RL301
R342
1MR
(MF)
C318
0.27U
250V
D308
1N4148
Q312
2SK2161
IAF640
C316
0.36U
400V
C317
0.68U
250V
R383
47K
208VPP
D314
RGP-10J
JUMP
R380
C336
1000P/1KV
JUMP
R381
R357
100K
C337
10u/250V
D310
RGP-10D
L307
3.9UH
C331
C334
220U
Q315
2SB647
C335
R359
150K


TO SPS PCB
+5V
PM1
PM3
15V
-12V
FB
B+
78V
6.3V
+12V
GND
R366
10K
Q324
2SB561
R367
360
R368
1K
LED
P102
78V
GND
+5V
12V
6.3V
CLAMP2
ACL
G1
TO VIDEO PCB
INT.
CONTRAST
VR311
100K
(CARBON)
78VPP
R251
2.2K
R253
1K
C226
0.1u/250V
(MEF)
R370
JUMP
EXT.
CONTRAST
VR310
10K
R369
2.4K
1200VPP
T302
FBT
H.V
FOCUS
SCREEN
C349
10U
50V
R391 7.5K
R364
220K
1/2W
C341
1UF/50V
D315
1N4148
Q317
2SA733
R365
1K
R363
8.2K
VR309
20K (ACL.)
(CARBON)
C340
220u/16V
VR307
D314
R357
100K
INT BRI.
500K (0.3W)
(CERMET)
VR308
EXT.BRI.
50K
JUMP
R380
C336
RSP-10J
1000P/1KV
C337
10u/250V
JUMP
R381
208VPP
D310
RSP-10D
R359
160K
C334
220U
Q315
2SB647
C335
C331

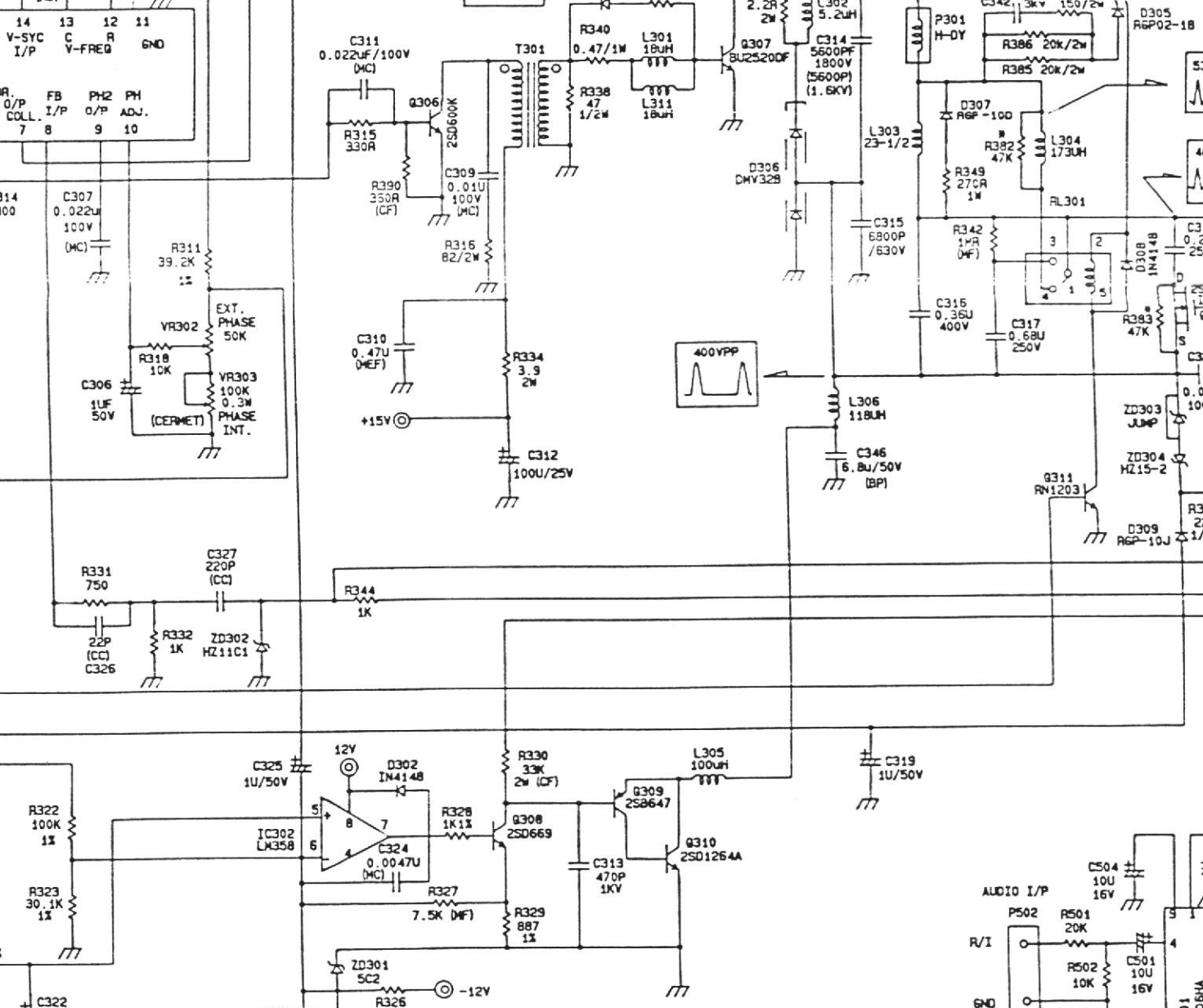


SIGNAL / H SYNC	F33K	F36K	F45K	F52K
HS < 33K	1	1	1	1
36K > HS 33K	0	1	1	1
45K > HS > 36K	0	0	1	1
52K > HS > 45K	0	0	0	1
60K > HS > 52K	0	0	0	0

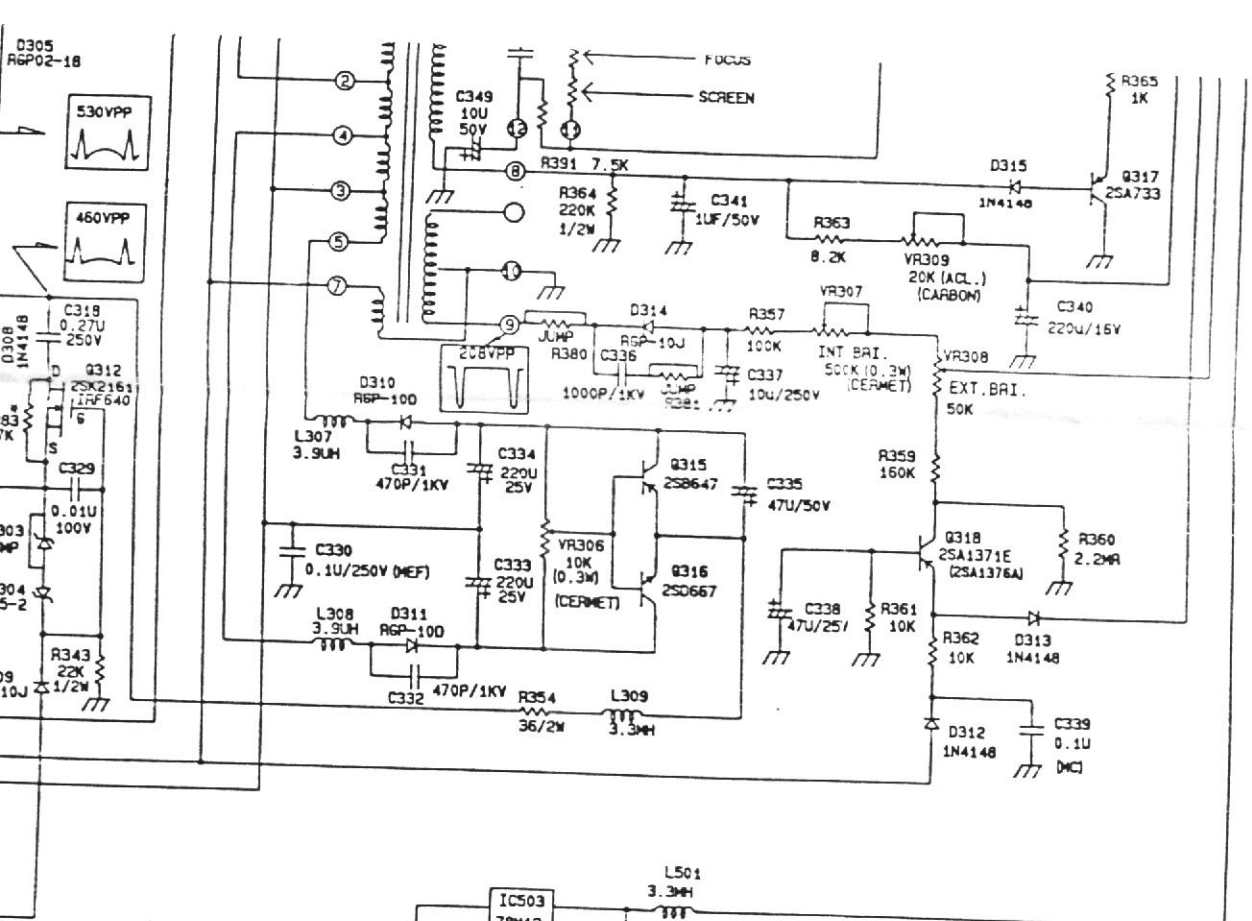
PARTS difference / CRT	R220	R215	R213	D205	R229
PHILIPS	1.5R/1W	4.3K	NC	1N4001	60.4K
TOSHIBA	1.8R/1W	2K	47K	NC	NC
SAMSUNG ONLY FOR PMS-5K4A/B PMS-5C4A/B	1.5R/1W	4.3K	NC	1N4001	60.4K

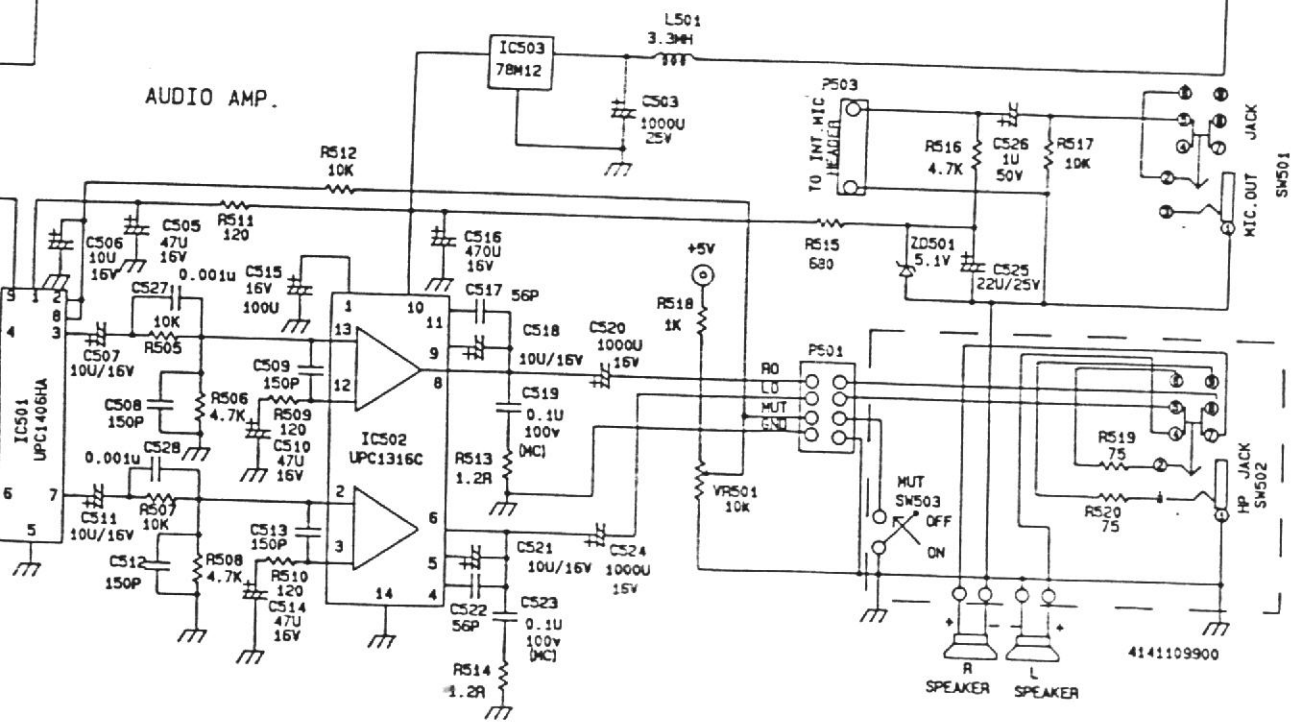


229	R230	R241	R226	R385	R386	R384	C342	D305	C317	C318	FBT
.4K	43R	33K	430R	20K/2W	20K/2W	150R/2W	1000P/3KV	RGP02-18	0.68U/250V	0.27U/250V	7050301500-000
NC	NC	51K	820R	20K/2W	20K/2W	150R/2W	1000P/3KV	RGP02-18	0.68U/250V	0.27U/250V	7050301500-000
.4K	43R	33K	430R	NC	NC	NC	NC	NC	0.62U/400V	0.22U/250V	7050301500-780 (SAMSUNG FBT)



ITEM		PHILIPS CRT	TOSHIBA CRT	SAMSUNG CRT	MATSUSHITA CRT
1	R220	1.5R/1W	1.8R 1W	1.5R 1W	1.8R 1W
2	R215	4.3K 1%	2K 1%	4.3K 1%	2.7K 1%
3	R213	(NC)	47K	(NC)	47K
4	D205	1N4001	(NC)	1N4001	(NC)
5	R229	60.4K 1%	(NC)	60.4K 1%	(NC)
6	R230	43R	(NC)	43R	(NC)
7	R241	33K	51K	33K	51K
8	R226	430R 1/2W	820R 1/2W	430R 1/2W	430R 1/2W
9	R63	1R 1/2W	0.47R 1/2W	JUMP WIRE	0.47R 1/2W
10	R385	20K 2W	20K 2W	(NC)	20K 2W
11	R386	20K 2W	20K 2W	(NC)	20K 2W
12	R384	150R 2W	150R 2W	(NC)	150R 2W
13	C342	1000P 3KV	1000P 3KV	(NC)	1000P 3KV
14	D305	RGP02-18	RGP02-18	(NC)	RGP02-18
15	T302	F.B.T	F.B.T	F.B.T (SAMSUNG)	F.B.T
16	C317	0.68uF 250V	0.68uF/250V	0.62uF 400V	0.68uF 250V
17	C318	0.27uF 250	0.27uF 250V	0.22uF 250V	0.27uF 250V
18	L303	COIL LINEARITY	COIL LINEARITY	COIL LINEARITY	COIL LINEARITY
19	Q206	(NC)	(NC)	RN1203	(NC)
20	R280	(NC)	(NC)	7.5K 1%	(NC)
21	J166	(NC)	(NC)	JUMP WIRE	(NC)
22	R130	22K 1%	22K 1%	22K 1%	23.7K 1%
23					





ViewSonic Corporation				
DRAWING DATE	TOLERANCE		SCALE	UNIT
04-09-'96	DIM	ANGLE	/	MM
	+ -	+ -		
DRAWER	SHEET		DRAWING NAME	FILENAME
	1 OF 1		DEF	
MODEL NO: 1562A-2				

4 3 2 1

8.2. Key to Exploded View

REF.	PART NO.	DESCRIPTION
1	1301015C41	BEZEL
2	13A7015K41	KNOB PUSH
3	1410095K41	#LENS
4	7020155K41	DEGAUSSING COIL W/AL MYLAR
5	7010023215	CRT M36EDR320X131/2F01
6	8507145025	SCREW BIND M5X25 W/LOCK
7	C001135K41	CRT BRAID WIRE ASS'Y
8	13B2115K40	#BRACKET (L)
9	13B1115K40	#BRACKET (R)
10	13J0015K40	#PUSH BAR
11	1BH00C5K40	#HOOK
12	8026113006	SCREW BIND(+) TAPPING TRIANGL FOR ANCHOR PLATE & M-PCB
13	13A6015K40	#KNOB ROTARY
14	MA5C405044-V	MAIN PCB ASS'Y
15	2001095K40	ANCHOR PLATE
16	C7105K4110	I/O CABLE ASS'Y 5FT GRY W/DDC1
17	4570704350	AC SOCKET
18	PS5K410244-V	NECK PCB ASS'Y
19	2005095K40	NECK SHIELD
20	1008197490	#FASTENER
21	3111453410	WASHER FLAT FOR REAR COVER
22	8026144016	SCREW B/HD M4X16 TAPPING "P"
23	1002297300	#BUCKET
24	8026144016	SCREW B/HD M4X16 TAPP
25	1010094310	FOOT
26	1015097490	BASE
27	1020097490	CAP FOR BUCKET

Other parts list

REF.	PART NO.	DESCRIPTION
	C459430030	GND WIRE ASS'Y 110MM #18 FOR NECK SHIELD TO REAR PANEL
	1023094330	SPACERS RING FOR FBT H.V. HAT
	C459430020	GND WIRE ASS'Y 135MM #18 FOR NECK SHIELD TO REAR PANEL
	361231503H	LOCK CAP
	36522CBS8R	SPACER SUPPROT CBS-8R FOR LID SHIELD
	36523ACB8A	SPACER SUPPORT ACBS-8A FOR PUSH BAR M-PCB
	463310001N	AC POWER CORD WALL UL/CSA GRY
	9012095C41	#MANUAL
	5541025095	CABLE TIE 2.5X90
	5541025160	CABLE TIE-BINDING 2.5X160
	5541036140	CABLE TIE 3.6X140MM
	5541036180	CABLE TIE W=3.6 L=180mm GT180I
	5541036300	CABLE TIE 3.6X300MM.

Section 8.
Mechanical Parts

8.1. Exploded View 8-1
8.2. Key to Exploded View 8-2

Section 9.
PCB Component List

9.1. Explanation of Parts Listing. 9-1
9.2. Main Board 9-1
9.3. Neck Board 9-6

9.1. Explanation of Parts Listing

This section contains a complete listing of the components used on the printed circuit boards contained in the system. For a listing of the mechanical parts, please refer to Section 8., Mechanical Parts.

The list of parts in this section is separated by PCB, and the order of the listing is based on the location reference (REF.) printed on the circuit board and shown in the schematics. Components without a reference location are listed at the beginning of each table in order of the part number, and the location reference of the part with which they are connected is given in the description.

For example:

	2003097301	HEAT SINK FOR Q1

shows Part No. 2003097301, which is connected or related to the components with a location reference of Q1.

Shaded items indicate comonents that are critical for safety or are of proprietary design and must be replaced with parts of the exact same specification or ordered directly from the manufacturer.

For example:

Q1	4101515070	TRS. MOSFET 2SK1507 TO-220

Indicates that the TRS. MOSFET, Part No. 4101515070 located at reference Q1, should onlybe replaced with the exact same part ordered from the manufacturer.

9.2. Main Board

REF.	PART NO.	DESCRIPTION
	MA5C405044 -V	MAIN PCB ASS'Y
	1003090000	NYLON BUSHING FOR IC201
	2002195K40	HEAT SINK
	2004094660	HEAT SINK HOLDER FOR Q1
	3052000300	EYELET FOR FBT
	3053070714	EYELET 3.07¢X7.14X5.08¢ FOR AC COCKET
	36223LEK02	LED HOLDER LEK2-4.5T FOR LED
	4120664630	LED LT6463-23-D51 5¢ G/Y
	4141109805	#P.C.B. MAIN
	5322280004	WIRE 1007 #22 GRY 2060-TERM1.8 FOR MPR2
	5510102500	TUBE SI-RUBBER 45T-11cX25L FOR Q1
	5520100004	INSULATOR SI-RUBBER TO-220 (W/ FOR IC201
	8026113006	SCREW BIND(+) TAPPING TRI ANGL FOR ANCHOR PLATE & M-PCB
	8026113010	SCREW BIND(+) TAPPING M3X10 TR FOR ANCHOR PLATE & A/C JACK X1
	8026113508	SCREW BID(+) M3.5X8 TAPPING ZI FOR H/S & M-PCB
	8283113015	SCREW BIND(+) M3X15 MACH W/SPR FOR Q1
	8504113006	SCREW BID(+) M3X6 MACH W/DISK FOR D306
	8504113008	SCREW BIND(+) M3X8 MACH W/DISK FOR QP3,D62,Q310
	8504113010	SCREW BIND(+) M3X10 MACH W/DIS FOR IC201,Q307
	9022394000	LABEL WARNING 27KV FOR BUCKET
	C488040051	CONN. 4P & WIRE ASS'Y W/CORE FOR CRT
	C488040080	CONN. 4P & WIRE ASS'Y FOR P101
	C488100017	CONN. 10P & WIRE ASS'Y FOR P102
C10	515P221S04	CAP-ECP 220UFM 400V -SF-
C103	5128390552	CAP-CCSL 39PFJ 50V -RT-
C104	5128390552	CAP-CCSL 39PFJ 50V -RT-
C105	5156221T10	CAP-EC6 220UFM 10V -RT-
C106	5101103152	CAP-CCB 0.01UFK 50V -RT-
C108	5116333550	CAP-MC 0.033UFJ 50V -RT-
C109	7181101552	CAP-COG 100PFJ 50V -AT-
C11	5190104143	CAP-MPP 0.1UFK 400V -SF-
C111	5116104150	CAP-MC 0.1UFK 50V -RT-
C14	5156470T25	CAP-EC6 47UFM 25V -RT-
C15	5101102152	CAP-CCB 1000PFK 50V -RT-
C16	5092103615	CAP-PP .01UFG 100V P:10mm -SF-
C17	5116472550	CAP-MC 0.0047UFJ 50V -RT-
C18	5156100T50	CAP-EC6 10UFM 50V -RT-
C19	5074104501	CAP-MEF 0.1UFJ 100V -SF-
C20	5128331552	CAP-CCSL 330PFJ 50V -RT-
C201	5156109T50	CAP-EC6 1UFM 50V -RT-
C202	5075224550	CAP-CF 0.22UFJ 50V P:5MM -RT-
C203	5156109T50	CAP-EC6 1UFM 50V -RT-
C204	5101103152	CAP-CCB 0.01UFK 50V -RT-
C205	5116473111	CAP-MC 0.047UFK 100V -RT-
C206	5116182150	CAP-MC 0.0018UFK 50V -RT-
C207	5074474105	CAP-MEF 0.47UFK 50V -SF-
C208	5156101T16	CAP-EC6 100UFM 16V -RT-
C209	5156101T16	CAP-EC6 100UFM 16V -RT-
C21	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C210	5156479T50	CAP-EC6 4.7UFM 50V -RT-
C211	515X471S16	CAP-ECX 470UFM 16V -SF-
C212	5113224111	CAP-MC 0.22UFK 100V -SF-
C213	5156221T35	CAP-EC6 220UFM 35V -RT-
C214	5156471T25	CAP-EC6 470UFM 25V -RT-
C215	5156479T50	CAP-EC6 4.7UFM 50V -RT-
C216	5128331552	CAP-CCSL 330PFJ 50V -RT-
C218	5101102152	CAP-CCB 1000PFK 50V -RT-
C219	5156101T16	CAP-EC6 100UFM 16V -RT-
C22	510H4711C3	CAP-CCR 470PFK 2KV P:7.5mm -SF
C221	5116104111	CAP-MC 0.1UFK 100V -RT-
C222	5116122111	CAP-MC 0.0012UFM 100V -RT-
C223	5116102111	CAP-MC 0.001UFK 100V -RT-
C224	5116102111	CAP-MC 0.001UFK 100V -RT-
C226	5074104102	CAP-MEF 0.1UFK 250V -SF-
C227	5156109T50	CAP-EC6 1UFM 50V -RT-
C241	5162229T50	CAP-NPEC 2.2UFM 50V -RT-
C3	5066224428	CAP-MPR 0.22UFM 275V -SF-
C301	5156229T50	CAP-EC6 2.2UFM 50V -RT-
C302	5116153111	CAP-MC 0.015UFK 100V -RT-
C303	5090222515	CAP-PL 0.0022UFJ 100V -SF-
C304	5128221552	CAP-CCSL 220PFJ 50V -RT-
C306	5156109T50	CAP-EC6 1UFM 50V -RT-
C307	5116223111	CAP-MC 0.022UFK 100V -RT-
C309	5116103111	CAP-MC 0.01UFK 100V -RT-
C310	5074474101	CAP-MEF 0.47UFK 100V P:10mm -S
C311	5116104111	CAP-MC 0.1UFK 100V -RT-
C312	515X101T25	CAP-ECX 100UFM 25V -RT-

8.1. Exploded View

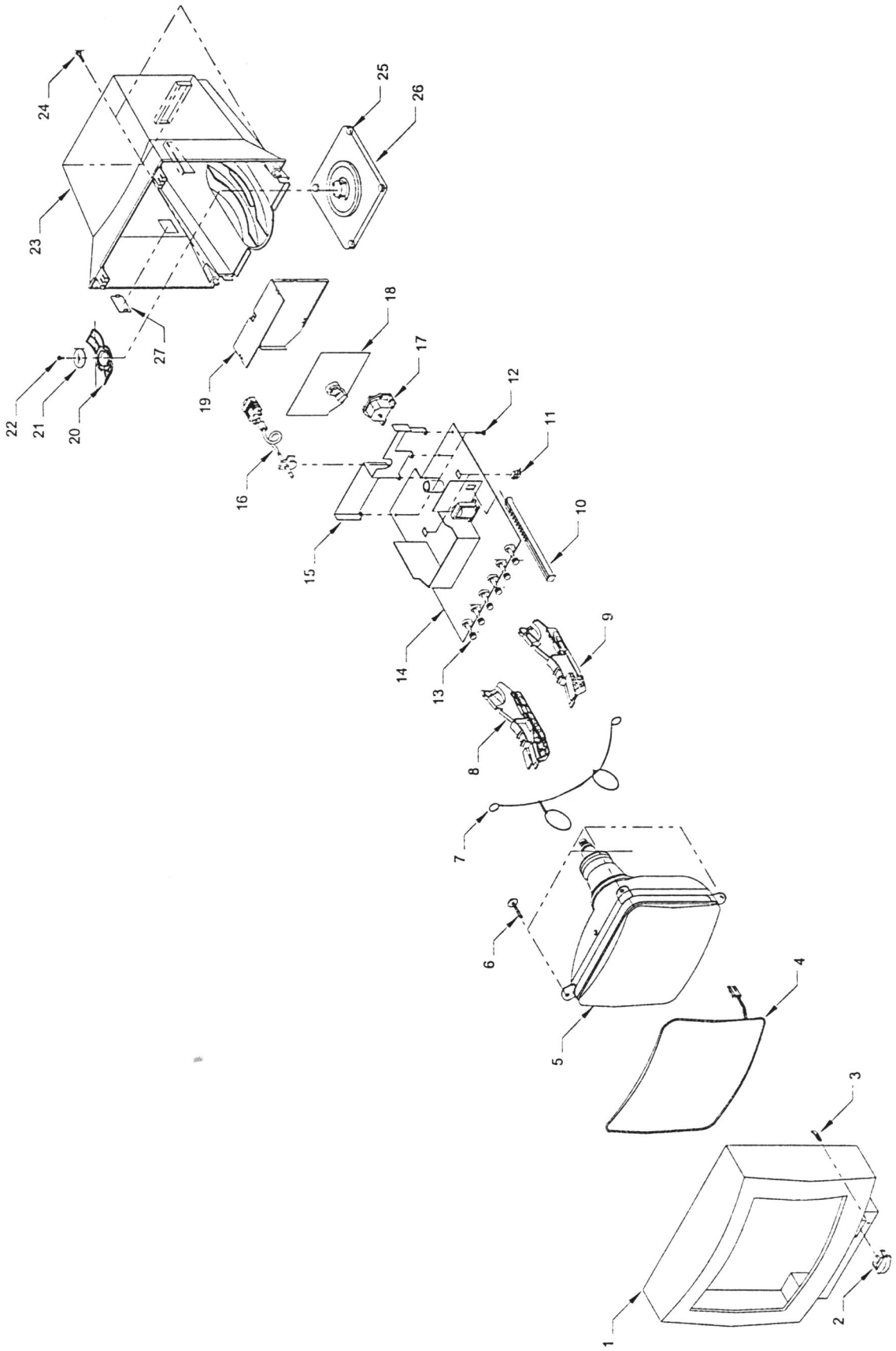


Figure 8-1 Exploded View

REF.	PART NO.	DESCRIPTION
C313	5101471132	CAP-CCB 470PFK 1KV -RT-
C314	5193562573	CAP-PMH 5600PFJ 1.6KV -SF-
C315	5092682565	CAP-PP 0.0068UFJ 630V -SF-
C316	5190364543	CAP-MPP 0.36UFJ 400V P:25MM -S
C317	5190684583	CAP-MPP 0.68UFJ 250V P:22.5MM
C318	5190274583	CAP-MPP 0.27UFJ 250V -SF-
C319	515E109T50	CAP-ECE 1UFM 50V -RT-
C321	5156109T50	CAP-EC6 1UFM 50V -RT-
C322	5156109T50	CAP-EC6 1UFM 50V -RT-
C323	515X470T10	CAP-ECX 47UFM 10V -RT-
C324	5116472111	CAP-MC 0.0047UFK 100V -RT-
C325	5156109T50	CAP-EC6 1UFM 50V -RT-
C326	5128220552	CAP-CCSL 22PFJ 50V -RT-
C327	5128221552	CAP-CCSL 220PFJ 50V -RT-
C329	5116103111	CAP-MC 0.01UFK 100V -RT-
C330	5074104102	CAP-MEF 0.1UFK 250V -SF-
C331	5101471132	CAP-CCB 470PFK 1KV -RT-
C332	5101471132	CAP-CCB 470PFK 1KV -RT-
C333	515X221T25	CAP-ECX 220UFM 25V -RT-
C334	515X221T25	CAP-ECX 220UFM 25V -RT-
C335	5156470T50	CAP-EC6 47UFM 50V -RT-
C336	5101102132	CAP-CCB 1000PFK 1KV -RT-
C337	5156100S03	CAP-EC6 10UFM 250V -SF-
C338	5156470T25	CAP-EC6 47UFM 25V -RT-
C339	5116104150	CAP-MC 0.1UFK 50V -RT-
C340	5156221T16	CAP-EC6 220UFM 16V -RT-
C341	5156109T50	CAP-EC6 1UFM 50V -RT-
C342	5101102193	CAP-CCB 1000PFK 3KV -SF-
C343	5156101T16	CAP-EC6 100UFM 16V -RT-
C345	5156109T50	CAP-EC6 1UFM 50V -RT-
C346	5169689S50	CAP-BP 6.8UFM 50V SF 105C
C347	5156100T50	CAP-EC6 10UFM 50V -RT-
C349	5156100T50	CAP-EC6 10UFM 50V -RT-
C4	5061472440	CAP-CCS 4700PFM 400V -SF-
C5	5066224428	CAP-MPR 0.22UFM 275V -SF-
C6	5061472440	CAP-CCS 4700PFM 400V -SF-
C60	515X101T50	CAP-ECX 100UFM 50V -RT-
C61	5101331132	CAP-CCB 330PFK 1KV -RT-
C62	515F221S01	CAP-ECF 220UFM 100V 12.5¢ -SF-
C63	5156471S25	CAP-EC6 470UFM 25V -SF-
C64	5074224101	CAP-MEF 0.22UFK 100V -SF-
C66	5156471S25	CAP-EC6 470UFM 25V -SF-
C67	5156471S25	CAP-EC6 470UFM 25V -SF-
C69	5074104501	CAP-MEF 0.1UFJ 100V -SF-
C71	5156101T16	CAP-EC6 100UFM 16V -RT-
C72	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C8	5061472440	CAP-CCS 4700PFM 400V -SF-
C9	5061472440	CAP-CCS 4700PFM 400V -SF-
CP1	5156471S25	CAP-EC6 470UFM 25V -SF-
CP10	515X101S07	CAP-ECX 100UFM 200V -SF-
CP11	5074104102	CAP-MEF 0.1UFK 250V -SF-
CP2	5156101T10	CAP-EC6 100UFM 10V -RT-
CP3	5128221552	CAP-CCSL 220PFJ 50V -RT-
CP4	5075102505	CAP-MEF 1000PFJ 50V CF
CP5	5116102111	CAP-MC 0.001UFK 100V -RT-
CP6	5156100T50	CAP-EC6 10UFM 50V -RT-
CP8	5074103505	CAP-MEF 0.01UFJ 50V -SF-
D1	41302525D8	DIODE 25D8 -AT-
D10	4120141480	DIODE 1N4148 (SI) -AT-
D101	4120141480	DIODE 1N4148 (SI) -AT-

REF.	PART NO.	DESCRIPTION
D102	4120141480	DIODE 1N4148 (SI) -AT-
D103	4120141480	DIODE 1N4148 (SI) -AT-
D104	4120141480	DIODE 1N4148 (SI) -AT-
D105	4120141480	DIODE 1N4148 (SI) -AT-
D106	4120141480	DIODE 1N4148 (SI) -AT-
D107	4120141480	DIODE 1N4148 (SI) -AT-
D108	4120141480	DIODE 1N4148 (SI) -AT-
D109	4120141480	DIODE 1N4148 (SI) -AT-
D11	4120141480	DIODE 1N4148 (SI) -AT-
D110	4120141480	DIODE 1N4148 (SI) -AT-
D111	4120141480	DIODE 1N4148 (SI) -AT-
D112	4120141480	DIODE 1N4148 (SI) -AT-
D113	4120141480	DIODE 1N4148 (SI) -AT-
D114	4120141480	DIODE 1N4148 (SI) -AT-
D115	4120141480	DIODE 1N4148 (SI) -AT-
D116	4120141480	DIODE 1N4148 (SI) -AT-
D117	4120141480	DIODE 1N4148 (SI) -AT-
D118	4120141480	DIODE 1N4148 (SI) -AT-
D119	4120141480	DIODE 1N4148 (SI) -AT-
D12	4120141480	DIODE 1N4148 (SI) -AT-
D120	4120141480	DIODE 1N4148 (SI) -AT-
D121	4120141480	DIODE 1N4148 (SI) -AT-
D122	4120141480	DIODE 1N4148 (SI) -AT-
D123	4120141480	DIODE 1N4148 (SI) -AT-
D124	4120141480	DIODE 1N4148 (SI) -AT-
D125	4120141480	DIODE 1N4148 (SI) -AT-
D126	4120141480	DIODE 1N4148 (SI) -AT-
D127	4120141480	DIODE 1N4148 (SI) -AT-
D128	4120141480	DIODE 1N4148 (SI) -AT-
D13	4120141480	DIODE 1N4148 (SI) -AT-
D130	4120141480	DIODE 1N4148 (SI) -AT-
D131	4120141480	DIODE 1N4148 (SI) -AT-
D133	4120141480	DIODE 1N4148 (SI) -AT-
D134	4120141480	DIODE 1N4148 (SI) -AT-
D14	4120141480	DIODE 1N4148 (SI) -AT-
D15	413010426C	DIODE BYV26C KINK FORMING -AT-
D2	41302525D8	DIODE 25D8 -AT-
D201	4120141480	DIODE 1N4148 (SI) -AT-
D202	4120141480	DIODE 1N4148 (SI) -AT-
D203	4120104001	DIODE 1N4001 -AT-
D205	4120104001	DIODE 1N4001 -AT-
D206	4120141480	DIODE 1N4148 (SI) -AT-
D207	4120141480	DIODE 1N4148 (SI) -AT-
D208	4120141480	DIODE 1N4148 (SI) -AT-
D230	4120141480	DIODE 1N4148 (SI) -AT-
D231	4120141480	DIODE 1N4148 (SI) -AT-
D233	4120141480	DIODE 1N4148 (SI) -AT-
D3	41302525D8	DIODE 25D8 -AT-
D301	4120141480	DIODE 1N4148 (SI) -AT-
D302	4120141480	DIODE 1N4148 (SI) -AT-
D304	413010010B	DIODE RGP10B-5391 -AT-
D305	4130100218	DIODE RGP02-18E-5300 -AT-
D306	41306032B0	DIODE DMV32B TO-220 1500V 6A/6
D307	413010010D	DIODE RGP10D-5302 -AT- 1A
D308	4120141480	DIODE 1N4148 (SI) -AT-
D309	413010010J	DIODE RGP10J-5390 1A 600V -AT-
D310	413010010D	DIODE RGP10D-5302 -AT- 1A
D311	413010010D	DIODE RGP10D-5302 -AT- 1A
D312	4120141480	DIODE 1N4148 (SI) -AT-
D313	4120141480	DIODE 1N4148 (SI) -AT-

REF.	PART NO.	DESCRIPTION
D314	413010010J	DIODE RGP10J-5390 1A 600V -AT-
D315	4120141480	DIODE 1N4148 (SI) -AT-
D316	4120141480	DIODE 1N4148 (SI) -AT-
D317	4120141480	DIODE 1N4148 (SI) -AT-
D4	41302525D8	DIODE 25D8 -AT-
D5	413010426C	DIODE BYV26C KINK FORMING -AT-
D6	413016436A	DIODE BYV36A -AT-
D61	413020426C	DIODE 2.3A/600V BYM26C -AT-
D62	4130505401	DIODE F5KF40 TO-220AC
D63	41303030F2	DIODE 30DF2
D64	41303030F1	DIODE 30DF1
D65	41303030F2	DIODE 30DF2
D69	4120141480	DIODE 1N4148 (SI) -AT-
D9	4120141480	DIODE 1N4148 (SI) -AT-
DP1	4120141480	DIODE 1N4148 (SI) -AT-
DP3	413020426C	DIODE 2.3A/600V BYM26C -AT-
F1	4692300001	CLIP-FUSE 5MM
F1	5268400052	FUSE 4A/250VAC
IC1	4159384200	IC UC3842A 8PIN
IC101	4159804510	IC WT8045N 28PIN N283
IC102	4159173580	IC HA17358 8PIN
IC103	4159555000	IC NE555 8PIN
IC201	4159817200	IC TDA8172 7PIN
IC202	4159495000	IC TDA4950 8PIN
IC301	41599102C0	IC TDA9102C 20PIN
IC302	4159173580	IC HA17358 8PIN
IC303	4159317001	IC LM317T W/MOUNTING KIT TO-22
IC61	415943100A	IC TL431 REGULATOR TO-92 -RT-
ICP1	415978L05A	IC MC78L05ACZ 3PIN
ICP2	4159555000	IC NE555 8PIN
ICP3	415943100A	IC TL431 REGULATOR TO-92 -RT-
L1	4321150006	COIL PEAKING 15UH -AT-
L2	4322309006	FERRITE BEAD 3UH -AT-
L201	4321101006	COIL PEAKING 100UH -AT-
L3	4322209046	FERRITE BEAD 2UH -AT-
L301	4321120006	COIL PEAKING 12UH -AT-
L302	4323529303	COIL CHOKE 5.2UH -SF-(W/TUBE)
L303	708S206301	COIL LINEARITY -SF-
L304	4323171003	COIL CHOKE 173uH
L305	4321101006	COIL PEAKING 100UH -AT-
L306	4325111003	COIL CHOKE 118UH -SF-
L307	4321399016	COIL PEAKING 3.9uH
L308	4321399016	COIL PEAKING 3.9uH
L309	4323339003	COIL CHOKE 3.3MH -SF-
L311	4321120006	COIL PEAKING 12UH -AT-
L4	4322209046	FERRITE BEAD 2UH -AT-
L5	4321101006	COIL PEAKING 100UH -AT-
L6	4322209046	FERRITE BEAD 2UH -AT-
L8	4322209046	FERRITE BEAD 2UH -AT-
L9	C459460020	GND WIRE ASS'Y W/CORE
LP1	4323112003	COIL CHOKE 1.1MH -SF-
P1	3340100150	BEAD PIN 1X15MM
P2	3340100150	BEAD PIN 1X15MM
P3	4490200207	CONN. 2P WAFER ROUND PIN 10MM
P301	4490400207	CONN. 4P WAFER ROUND PIN
PH1	4159435002	POTO COUPLER X'STER 4N35 W=10
PTCR1	7021134091	PTCR PTH451C262BF140M270
Q1	4101515070	TRS. MOSFET 2SK1507 TO-220
Q101	4116612030	TRS. RN1203 -RT-
Q102	411020945P	TRS. 2SC945P TO-92 -RT-

REF.	PART NO.	DESCRIPTION
Q103	411020945P	TRS. 2SC945P TO-92 -RT-
Q104	411020945P	TRS. 2SC945P TO-92 -RT-
Q105	4116612030	TRS. RN1203 -RT-
Q201	411020945P	TRS. 2SC945P TO-92 -RT-
Q202	411020945P	TRS. 2SC945P TO-92 -RT-
Q203	411020945P	TRS. 2SC945P TO-92 -RT-
Q204	411030667C	TRS. 2SD667C TO-92M -RT-
Q205	411020945P	TRS. 2SC945P TO-92 -RT-
Q301	411020945P	TRS. 2SC945P TO-92 -RT-
Q302	411020945P	TRS. 2SC945P TO-92 -RT-
Q306	410030600K	TRS. 2SD600KF TO-126
Q307	4102725200	TRS. BU2520DF/ON4820 S07-199
Q308	410030669A	TRS. 2SD669A TO-126
Q309	411010647C	TRS. 2SB647C TO-92M -RT-
Q310	410031264A	TRS. 2SD1264A
Q311	4116612030	TRS. RN1203 -RT-
Q312	4101521610	TRS. MOSFET 2SK2161
Q313	4110007330	TRS. 2SA733 TO-92M -RT-
Q314	411020945P	TRS. 2SC945P TO-92 -RT-
Q315	411010647C	TRS. 2SB647C TO-92M -RT-
Q316	411030667C	TRS. 2SD667C TO-92M -RT-
Q317	4110007330	TRS. 2SA733 TO-92M -RT-
Q318	4112409200	TRS. KSP92 TO-92
Q324	4110105610	TRS. 2SB561 TO-92 -RT-
Q4	4110105610	TRS. 2SB561 TO-92 -RT-
Q5	4114501006	TRS. MCR100-6 TO-92 -RT-
Q61	411022120Y	TRS. 2SC2120Y TO-92 -RT-
Q62	411030667A	TRS. 2SD667A TO-92M -RT-
QP1	411022120Y	TRS. 2SC2120Y TO-92 -RT-
QP2	411022120Y	TRS. 2SC2120Y TO-92 -RT-
QP3	4101521610	TRS. MOSFET 2SK2161
QP4	411022120Y	TRS. 2SC2120Y TO-92 -RT-
R1	4050182455	RES-CF 1/2W J 820K SMALL -AT-
R103	4050510655	RES-CF 1/4W J 10M SMALL -AT-
R104	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R105	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R106	4257041503	RES-PR MF 1/4W F 150K -AT-
R107	4257045622	RES-PR MF 1/4W F 56.2K SMALL -
R108	4050530255	RES-CF 1/4W J 3K -AT- SMALL
R109	4050530255	RES-CF 1/4W J 3K -AT- SMALL
R11	4095022151	RES-WW 5W J 220R SQM-SF
R110	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R111	4050520255	RES-CF 1/4W J 2K -AT- SMALL
R112	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R113	4050520255	RES-CF 1/4W J 2K -AT- SMALL
R114	4050547355	RES-CF 1/4W J 47K -AT- SMALL
R115	4050547355	RES-CF 1/4W J 47K -AT- SMALL
R117	4050547355	RES-CF 1/4W J 47K -AT- SMALL
R118	4257042372	RES-PR MF 1/4W F 23.7K SMALL -
R119	4257042002	RES-PR MF 1/4W F 20K AT SMALL
R120	4050562355	RES-CF 1/4W J 62K SMALL -AT-
R121	4050522255	RES-CF 1/4W J 2.2K -AT- SMALL
R122	4257046041	RES-PR MF 1/4W F 6.04K SMALL -
R123	4257046041	RES-PR MF 1/4W F 6.04K SMALL -
R124	4257047501	RES-PR MF 1/4W F 7.5K AT SMALL
R125	4257046041	RES-PR MF 1/4W F 6.04K SMALL -
R126	4257045601	RES-PR MF 1/4W F 5.6K AT SMALL
R127	4257049531	RES-PR MF 1/4W F 9.53K SMALL -
R128	4257041302	RES-PR MF 1/4W F 13K AT SMALL
R129	4257045761	RES-PR MF 1/4W F 5.76K SMALL -

REF.	PART NO.	DESCRIPTION
R13	4050512555	RES-CF 1/4W J 1.2M SMALL -AT-
R130	4257042202	RES-PR MF 1/4W F 22K SMALL -AT
R131	4257041472	RES-PR MF 1/4W F 14.7K SMALL -
R132	4257041152	RES-PR MF 1/4W F 11.5K SMALL -
R133	4257041212	RES-PR MF 1/4W F 12.1K SMALL -
R134	4257041582	RES-PR MF 1/4W F 15.8K AT SMAL
R135	4257042872	RES-PR MF 1/4W F 28.7K SMALL -
R136	4257043162	RES-PR MF 1/4W F 31.6K SMALL -
R137	4257048062	RES-PR MF 1/4W F 80.6K SMALL -
R138	4257041004	RES-PR MF 1/4W F 1M SMALL -AT-
R139	4257045362	RES-PR MF 1/4W F 53.6K SMALL -
R14	4050527255	RES-CF 1/4W J 2.7K -AT- SMALL
R140	4257046042	RES-PR MF 1/4W F 60.4K AT SMAL
R141	4257041153	RES-PR MF 1/4W F 115K SMALL -A
R142	4257041004	RES-PR MF 1/4W F 1M SMALL -AT-
R144	4257044992	RES-PR MF 1/4W F 49.9K SMALL -
R145	4050536255	RES-CF 1/4W J 3.6K SMALL -AT-
R15	4257045761	RES-PR MF 1/4W F 5.76K SMALL -
R150	4050547355	RES-CF 1/4W J 47K -AT- SMALL
R151	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R152	4257048452	RES-PR MF 1/4W F 84.5K SMALL -
R153	4257041822	RES-PR MF 1/4W F 18.2K SMALL -
R154	4257047502	RES-PR MF 1/4W F 75K SMALL -AT
R19	4050556555	RES-CF 1/4W J 5.6M SMALL -AT-
R2	7104016037	THMER +-15% 4A 16R 15¢
R20	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R201	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R202	4050515955	RES-CF 1/4W J 1.5R SMALL -AT-
R204	4050510555	RES-CF 1/4W J 1M -AT- SMALL
R205	4257043482	RES-PR MF 1/4W F 34.8K SMALL -
R206	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R207	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R208	4050512455	RES-CF 1/4W J 120K -AT- SMALL
R209	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R21	4050515355	RES-CF 1/4W J 15K -AT- SMALL
R211	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R212	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R214	4050551355	RES-CF 1/4W J 51K -AT- SMALL
R215	4257044301	RES-PR MF 1/4W F 4.3K AT SMALL
R216	4050575255	RES-CF 1/4W J 7.5K -AT- SMALL
R217	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R218	4050591355	RES-CF 1/4W J 91K SMALL -AT-
R219	4050551255	RES-CF 1/4W J 5.1K -AT- SMALL
R22	4050551255	RES-CF 1/4W J 5.1K -AT- SMALL
R220	4171015956	RES-MOF 1W J 1.5R -AT-
R222	4257044701	RES-PR MF 1/4W F 4.7K AT SMALL
R223	4257044702	RES-PR MF 1/4W F 47K AT SMALL
R224	4257041003	RES-PR MF 1/4W F 100K AT SMALL
R225	4050512955	RES-CF 1/4W J 1.2R SMALL -AT-
R226	4050143155	RES-CF 1/2W J 430R SMALL -AT-
R227	4050516455	RES-CF 1/4W J 160K SMALL -AT-
R228	4172010956	RES-MOF 2W J 1R -AT-
R229	4257046042	RES-PR MF 1/4W F 60.4K AT SMAL
R23	4050551255	RES-CF 1/4W J 5.1K -AT- SMALL
R230	4050543055	RES-CF 1/4W J 43R -AT- SMALL
R231	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R234	4050547355	RES-CF 1/4W J 47K -AT- SMALL
R235	4050547355	RES-CF 1/4W J 47K -AT- SMALL
R236	4050568355	RES-CF 1/4W J 68K -AT- SMALL
R237	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL

REF.	PART NO.	DESCRIPTION
R239	4257041002	RES-PR MF 1/4W F 10K AT SMALL
R24	4050547055	RES-CF 1/4W J 47R -AT- SMALL
R240	4050518455	RES-CF 1/4W J 180K SMALL -AT-
R241	4050533355	RES-CF 1/4W J 33K SMALL -AT-
R243	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R244	4257045623	RES-PR MF 1/4W F 562K SMALL -A
R245	4257042743	RES-PR MF 1/4W F 274K SMALL -A
R246	4257048201	RES-PR MF 1/4W F 8.2K AT SMALL
R247	4050520255	RES-CF 1/4W J 2K -AT- SMALL
R249	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R25	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R250	4050527255	RES-CF 1/4W J 2.7K -AT- SMALL
R251	4050522255	RES-CF 1/4W J 2.2K -AT- SMALL
R253	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R254	4050527355	RES-CF 1/4W J 27K -AT- SMALL
R255	4050527355	RES-CF 1/4W J 27K -AT- SMALL
R256	4050520355	RES-CF 1/4W J 20K -AT- SMALL
R26	4050575155	RES-CF 1/4W J 750R SMALL -AT-
R263	4050522255	RES-CF 1/4W J 2.2K -AT- SMALL
R264	4050562255	RES-CF 1/4W J 6.2K -AT- SMALL
R27	4050533255	RES-CF 1/4W J 3.3K -AT- SMALL
R28	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R29	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R290	4257041004	RES-PR MF 1/4W F 1M SMALL -AT-
R30	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R301	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R302	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R303	4050515355	RES-CF 1/4W J 15K -AT- SMALL
R305	4257041502	RES-PR MF 1/4W F 15K AT SMALL
R306	4257041001	RES-PR MF 1/4W F 1K AT SMALL
R307	4257042431	RES-PR MF 1/4W F 2.43K AT SMAL
R308	4257043601	RES-PR MF 1/4W F 3.6K AT SMALL
R309	4050524355	RES-CF 1/4W J 24K -AT- SMALL
R31	4050524055	RES-CF 1/4W J 24R SMALL -AT-
R310	4050533255	RES-CF 1/4W J 3.3K -AT- SMALL
R311	4257043922	RES-PR MF 1/4W F 39.2K AT SMAL
R312	4257041132	RES-PR MF 1/4W F 11.3K SMALL -
R313	4257041002	RES-PR MF 1/4W F 10K AT SMALL
R314	4050530155	RES-CF 1/4W J 300R SMALL -AT-
R315	4050568155	RES-CF 1/4W J 680R SMALL -AT-
R316	4177282056	RES-MOF 2W J 82R -AT-
R317	4050530355	RES-CF 1/4W J 30K SMALL -AT-
R318	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R319	4172022956	RES-MOF 2W J 2.2R -AT-
R32	4072033855	RES-MF 2W J 0.33R -AT-
R322	4257041003	RES-PR MF 1/4W F 100K AT SMALL
R323	4257043012	RES-PR MF 1/4W F 30.1K AT SMAL
R326	4257041001	RES-PR MF 1/4W F 1K AT SMALL
R327	4257047501	RES-PR MF 1/4W F 7.5K AT SMALL
R328	4257041001	RES-PR MF 1/4W F 1K AT SMALL
R329	4257048870	RES-PR MF 1/4W F 887R SMALL -A
R33	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R330	4052033355	RES-CF 2W J 33K -AT-
R331	4050575155	RES-CF 1/4W J 750R SMALL -AT-
R332	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R334	4172039956	RES-MOF 2W J 3.9R -AT-
R338	4050147055	RES-CF 1/2W J 47R -AT- SMALL
R34	4050518255	RES-CF 1/4W J 1.8K -AT- SMALL
R340	4171047856	RES-MOF 1W J 0.47R -AT-
R341	4050522255	RES-CF 1/4W J 2.2K -AT- SMALL

REF.	PART NO.	DESCRIPTION
R342	4257041004	RES-PR MF 1/4W F 1M SMALL -AT-
R343	4050122355	RES-CF 1/2W J 22K SMALL -AT-
R344	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R345	4257044301	RES-PR MF 1/4W F 4.3K AT SMALL
R346	4257041872	RES-PR MF 1/4W F 18.7K SAMLL -
R349	4171027156	RES-MOF 1W J 270R -AT-
R350	4257044301	RES-PR MF 1/4W F 4.3K AT SMALL
R351	4050556355	RES-CF 1/4W J 56K SMALL -AT-
R352	4257043012	RES-PR MF 1/4W F 30.1K AT SMAL
R353	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R354	4172036056	RES-MOF 2W J 36R -AT-
R357	4050510455	RES-CF 1/4W J 100K -AT- SMALL

REF.	PART NO.	DESCRIPTION
RP13	4050510555	RES-CF 1/4W J 1M -AT- SMALL
RP14	4257044302	RES-PR MF 1/4W F 43K SMALL -AT
RP16	4050510155	RES-CF 1/4W J 100R -AT- SMALL
RP17	4050551255	RES-CF 1/4W J 5.1K -AT- SMALL
RP18	4050527255	RES-CF 1/4W J 2.7K -AT- SMALL
RP19	4050510255	RES-CF 1/4W J 1K -AT- SMALL
RP20	4071033855	RES-MF 1W J 0.33R -AT-
RP21	4050510255	RES-CF 1/4W J 1K -AT- SMALL
RP22	4050510255	RES-CF 1/4W J 1K -AT- SMALL
RP4	4050551255	RES-CF 1/4W J 5.1K -AT- SMALL
RP5	4050510255	RES-CF 1/4W J 1K -AT- SMALL

MM
.3W 100K 6¢ LAY-O
.3W 50K 6¢ LAY-DO
.1W 100K 6¢ STAND
.3W 100K 6¢ STAND
.3W 3K 6¢ STAND-O
ENT-
.1W 20K 6¢ STAND-
.1W 20K 6¢ STAND-
.1W 100K 6¢ STAND
.3W 2K 6¢ STAND-O
ENT
.3W 100K 6¢ STAND
.3W 5K 6¢ STAND-O
.3W 10K 6¢ LAY-DO
.3W 500K 6¢ LAY-D
ENT
.1W 20K 6¢ LAY-DO
.1W 100K 6¢ LAY-D
.3W 20K 6¢ LAY-DO
NATOR CSA3.58MG
MTZJ16C -AT-
MTZJ9.1C -AT-
MTZJ22C -AT-
HZ5C2 1/2W 5.1V -A
MTZJ11C
4.5-15.1V -AT-
MTZJ9.1C -AT-
MTZJ13A -AT-
W 160V +-5% DO-3

R372	4257047501	RES-PR MF 1/4W F 7.5K AT SMALL
R38	4050518055	RES-CF 1/4W J 18R -AT- SMALL
R382	4050547355	RES-CF 1/4W J 47K -AT- SMALL
R383	4050547355	RES-CF 1/4W J 47K -AT- SMALL
R384	4172015156	RES-MOF 2W J 150R -AT-
R385	4172020356	RES-MOF 2W J 20K -AT-
R386	4172020356	RES-MOF 2W J 20K -AT-
R39	4050512155	RES-CF 1/4W J 120R -AT- SMALL
R390	4050536155	RES-CF 1/4W J 360R SMALL -AT-
R391	4050575255	RES-CF 1/4W J 7.5K -AT- SMALL
R4	4071033855	RES-MF 1W J 0.33R -AT-
R43	4050520155	RES-CF 1/4W J 200R -AT- SMALL
R45	4050520355	RES-CF 1/4W J 20K -AT- SMALL
R5	4095010351	RES-WW 5W J 10K SQM-SF
R61	4171075256	RES-MOF 1W J 7.5K -AT-
R62	4095022151	RES-WW 5W J 220R SQM-SF
R63	4180210955	RES-FUSIBLE 1/2W J 1R -AT-
R67	4050522155	RES-CF 1/4W J 220R SMALL -AT-
R69	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R70	4050547155	RES-CF 1/4W J 470R SMALL -AT-
R72	4257041002	RES-PR MF 1/4W F 10K AT SMALL
R73	4257044021	RES-PR MF 1/4W F 4.02K SMALL -
R74	4050533455	RES-CF 1/4W J 330K SMALL -AT-
R79	4257045492	RES-PR MF 1/4W F 54.9K SMALL -
R8	4177324353	RES-MOF 3W J 24K SMALL -SF-
R80	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R88	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R89	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R9	4177324353	RES-MOF 3W J 24K SMALL -SF-
RL301	4420412002	RELAY 12V
RN101	4082101035	RES-NET 10P J 10KR COMMON
RP10	4050510255	RES-CF 1/4W J 1K -AT- SMALL
RP11	4050510255	RES-CF 1/4W J 1K -AT- SMALL
RP12	4050510355	RES-CF 1/4W J 10K -AT- SMALL

TP301	3340100150	BEAD PIN 1X15
VR101	5225110410	POT(CERMET)
VR102	5225150310	POT(CERMET)
VR201	522B1104B0	POT(CARBON)
VR202	5221104B0	POT(CERMET)
VR203	502104B420	VR 100K B
VR204	5221302B0	POT(CERMET)
VR205	502503B432	VR 50KB W/DET
VR206	522B1203B0	POT(CARBON)
VR207	522B1203B0	POT(CARBON)
VR208	522B1104B0	POT(CARBON)
VR301	5221202B0	POT(CERMET)
VR302	502503B432	VR 50KB W/DET
VR303	5221104B0	POT(CERMET)
VR304	5221150200	POT(CERMET)
VR305	502103B408	VR 10K B
VR306	5225110310	POT(CERMET)
VR307	5225150410	POT(CERMET)
VR308	502503B432	VR 50KB W/DET
VR309	5228120310	POT(CARBON)
VR310	502103B417	VR 10K B
VR311	5228110410	POT(CARBON)
VRP1	5225120310	POT(CERMET)
XT101	7153580006	CERAMIC RES
ZD1	41205016CU	DIODE ZENER
ZD201	41205091CU	DIODE ZENER
ZD3	41205022CU	DIODE ZENER
ZD301	4120500561	DIODE ZENER
ZD302	41205011CU	DIODE ZENER
ZD304	4120500152	DIODE ZENER
ZD305	41205091CU	DIODE ZENER
ZD61	41205013AU	DIODE ZENER
ZDP1	412050990B	Z-D 1N990B 0.5

9.3. Neck Board

REF.	PART NO.	DESCRIPTION
	PS5K410244 -V	NECK PCB ASS'Y
	2005095K40	NECK SHIELD
	2023090000	HEAT SINK FOR 1Q2,3Q2,5Q2
	4141109403	P.C.B. VIDEO
	8026113008	SCREW BID(+) ZINC M3X8 TAPPING FOR 1Q2,3Q2,5Q2
	C459178211	GND WIRE ASS'Y 145MM "F" VIDEO TO REAR PANEL
1C1	5156100T50	CAP-EC6 10UFM 50V -RT-
1C3	5134104452	CAP-SCF 0.1UFZ 50V -RT-
1C5	5128121552	CAP-CCSL 120PFJ 50V -RT-
1D2	4120141480	DIODE 1N4148 (SI) -AT-
1D3	4120141480	DIODE 1N4148 (SI) -AT-
1D4	4120141480	DIODE 1N4148 (SI) -AT-
1L3	4321479006	COIL PEAKING 4.7UH -AT-
1Q1	4115023690	TRS. PN2369 TO-92 -RT-
1Q2	4100239530	TRS. 2SC3953 TO-126
1R1	4257047509	RES-PR MF 1/4W F 75R AT SMALL
1R3	4050510355	RES-CF 1/4W J 10K -AT- SMALL
1R4	4050543055	RES-CF 1/4W J 43R -AT- SMALL
1R5	4050522155	RES-CF 1/4W J 220R SMALL -AT-
1R6	4050539155	RES-CF 1/4W J 390R -AT- SMALL
1R7	4050510155	RES-CF 1/4W J 100R -AT- SMALL
1R8	4050543055	RES-CF 1/4W J 43R -AT- SMALL
1R9	4050562055	RES-CF 1/4W J 62R SMALL -AT-
1V1	522B110100	POT(CARBON) 0.1W 100R 6¢ STAND
1V2	522B120200	POT(CARBON) 0.1W 2K 6¢ STAND-O
2R2	4050527055	RES-CF 1/4W J 27R SMALL -AT-
3R4	4050543055	RES-CF 1/4W J 43R -AT- SMALL
3R5	4050522155	RES-CF 1/4W J 220R SMALL -AT-
3R6	4050539155	RES-CF 1/4W J 390R -AT- SMALL
3R7	4050510155	RES-CF 1/4W J 100R -AT- SMALL
3R8	4050543055	RES-CF 1/4W J 43R -AT- SMALL
3R9	4050562055	RES-CF 1/4W J 62R SMALL -AT-
3V1	522B110100	POT(CARBON) 0.1W 100R 6¢ STAND
3V2	522B120200	POT(CARBON) 0.1W 2K 6¢ STAND-O
4R2	4050527055	RES-CF 1/4W J 27R SMALL -AT-
4R4	4095010250	RES-WW 5W J 1K SQY-C
4R5	4050268055	RES-CF 1/2W J 68R -AT-
4RA	4050510355	RES-CF 1/4W J 10K -AT- SMALL
4RB	4050515255	RES-CF 1/4W J 1.5K SMALL -AT-
5C1	5156100T50	CAP-EC6 10UFM 50V -RT-
5C3	5134104452	CAP-SCF 0.1UFZ 50V -RT-
5C4	5128560552	CAP-CCSL 56PFJ 50V -RT-
5C5	5128121552	CAP-CCSL 120PFJ 50V -RT-
5D2	4120141480	DIODE 1N4148 (SI) -AT-
5D3	4120141480	DIODE 1N4148 (SI) -AT-
5D4	4120141480	DIODE 1N4148 (SI) -AT-
5L2	4322309006	FERRITE BEAD 3UH -AT-
5L3	4321479006	COIL PEAKING 4.7UH -AT-
5Q1	4115023690	TRS. PN2369 TO-92 -RT-
5Q2	4100239530	TRS. 2SC3953 TO-126
5R1	4257047509	RES-PR MF 1/4W F 75R AT SMALL
5R3	4050510355	RES-CF 1/4W J 10K -AT- SMALL
5R4	4050543055	RES-CF 1/4W J 43R -AT- SMALL
5R5	4050522155	RES-CF 1/4W J 220R SMALL -AT-
5R6	4050539155	RES-CF 1/4W J 390R -AT- SMALL
5R7	4050510155	RES-CF 1/4W J 100R -AT- SMALL
5R8	4050543055	RES-CF 1/4W J 43R -AT- SMALL
5R9	4050562055	RES-CF 1/4W J 62R SMALL -AT-
5V2	522B120200	POT(CARBON) 0.1W 2K 6¢ STAND-O
6R2	4050527055	RES-CF 1/4W J 27R SMALL -AT-
6R4	4095010250	RES-WW 5W J 1K SQY-C
6R5	4050268055	RES-CF 1/2W J 68R -AT-
6RA	4050510355	RES-CF 1/4W J 10K -AT- SMALL
6RB	4050515255	RES-CF 1/4W J 1.5K SMALL -AT-
6RC	4050556055	RES-CF 1/4W J 56R SMALL -AT-
7C0	5134104452	CAP-SCF 0.1UFZ 50V -RT-
7C2	5134104452	CAP-SCF 0.1UFZ 50V -RT-
7C3	5156221T16	CAP-EC6 220UFM 16V -RT-
7C4	5134104452	CAP-SCF 0.1UFZ 50V -RT-
7C5	5156100T50	CAP-EC6 10UFM 50V -RT-
7R6	4050520255	RES-CF 1/4W J 2K -AT- SMALL
7R9	4050520255	RES-CF 1/4W J 2K -AT- SMALL
7RA	4050510255	RES-CF 1/4W J 1K -AT- SMALL
7RB	4050510355	RES-CF 1/4W J 10K -AT- SMALL
7RH	4050510255	RES-CF 1/4W J 1K -AT- SMALL
7RI	4050543155	RES-CF 1/4W J 430R -AT- SMALL
7RJ	4050510255	RES-CF 1/4W J 1K -AT- SMALL
8C1	5134104452	CAP-SCF 0.1UFZ 50V -RT-
8C2	5103102293	CAP-CCE 1000PFM 3KV -SF-
8C3	5103102293	CAP-CCE 1000PFM 3KV -SF-
8C4	7140104214	CAP-X7R 0.1UFM 100V -RT-
8C6	5134104452	CAP-SCF 0.1UFZ 50V -RT-
8C8	5156470S01	CAP-EC6 47UFM 100V -SF-
8D1	413010010G	DIODE RGP10G-5390 -AT-

REF.	PART NO.	DESCRIPTION
8L2	4322209046	FERRITE BEAD 2UH -AT-
8R1	4050547355	RES-CF 1/4W J 47K -AT- SMALL
8R2	4050543055	RES-CF 1/4W J 43R -AT- SMALL
8R3	4050543055	RES-CF 1/4W J 43R -AT- SMALL
8R4	4050510155	RES-CF 1/4W J 100R -AT- SMALL
8R5	4050510155	RES-CF 1/4W J 100R -AT- SMALL
8R6	4060210115	RES-CC 1/2W K 100R -AT-
8R7	4060251315	RES-CC 1/2W K 51K -AT-
8Z1	4120500561	DIODE ZENER RD5.1EB2 1/2W -AT-
8Z2	4120500561	DIODE ZENER RD5.1EB2 1/2W -AT-
8Z3	4120500561	DIODE ZENER RD5.1EB2 1/2W -AT-
9R7	4050510355	RES-CF 1/4W J 10K -AT- SMALL
9R8	4050510355	RES-CF 1/4W J 10K -AT- SMALL
BP2	3340230165	BEAD PIN 16.5X2.3c
FT1	7095470210	NOISE FILTER
FT2	7095470210	NOISE FILTER
FT3	7095470210	NOISE FILTER
IC4	5128330552	CAP-CCSL 33PFJ 50V -RT-
ICA	4159242100	IC 24LC21 8PIN
ICB	4159120301	IC LM1203BN 28PIN
P1	4491200130	CONN. 12P B12B-XH-A
P2	4491000130	CONN. 10P WAFER
P3	4490400130	CONN. 4P WAFER (BXB-XH-A) P221
SK1	4570301400	CRT SOCKET TYPE 03305500-44

Preface
Before You Start

General Safety Precautions

1. Use an isolation transformer in the power line and AC supply to troubleshoot.
2. When servicing, observe the original lead dress, especially in the high voltage circuits. If a short circuit is found, replace all parts which have been overheated or damaged.
3. Before turning the display on, measure the resistance between B+ line and chassis ground. Connect the negative side of an ohmmeter to the B+ lines and the positive side to chassis ground. Each line should have more resisstance than the following specifications:

B+ Line	Minimum Resistance
50.5V	61.27KΩ
78V	82.71KΩ
15V	22.42KΩ
-12V	34.34KΩ
6.2V	5.97Ω
5V	4.063KΩ

4. Potentials, as high as 24.5kV are present when this display is in operation. Operation of the display without the rear cover involves the danger of a shock hazard from the display power supply. Servicing should not be attempted by anyone who is not thoroughly familiar with the precautions necessary when working on high voltage equipment. Always discharge the anode of the picture tube to the display chassis before handling the tube.
5. After servicing, be sure to check the items listed in the Safety Checkout below, before returning the serviced unit to the customer.

Safety Checkout

The following checks must be made after correcting the original service problem and before the unit is returned to the customer.

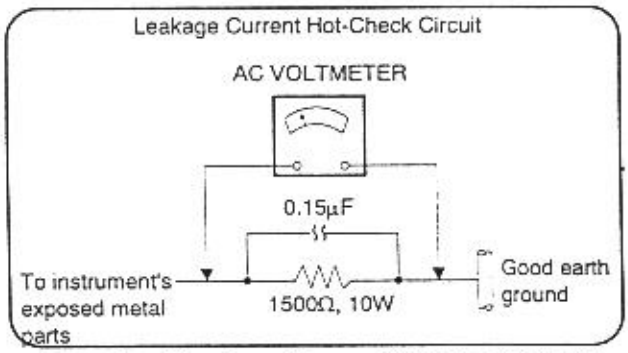
1. Check the area of your repair for unsoldered or poorly soldered connections. Check the entire board surface for solder splashes and bridges.
2. Check the inter board wiring to ensure that no wires are pinched or coated with high-wattage resistors.
3. Check that all control knobs, shields, covers, ground straps and mounting hardware have been replaced. Made. absolutely sure you have replaced all the insulators.
4. Look for any unauthorized replacement parts, particularly transistors, that may have been installed during a previous repair. Point them out to the cusstomer and recommend their replacement.
5. Look for parts which, though functioning, show obvious signs of deterioration. Point them out to the customer and recommend their replacement.
6. Check the line cord for cracks and abrasion. Recommend the replacement of any such line cord to the customer.
7. After making any repair, check the B+ and HV to see whether they are at the values specified. Make sure your instruments are accurate; if your HV meter always shows a low HV, check the meter to ensure it is not malfunctioning.
8. Carry out the leakage current checks as detailed below overleaf.

Leakage Current Cold Check

1. Unplug the AC cord and connect a jumper between the two prongs on the plug.
2. Turn on the display power switch.
3. Use an ohmmeter to measure the resistance value between the jumpered AC plug and each exposed metallic cabinet part on the display, such as screwheads, terminals, control shafts, etc. When an exposed metallic part has a return path to the chassis, the reading should be between 240k and 5.2M. When exposed metal does not have a return path to the chassis, the reading must be 0.

Leakage Current Hot Check

1. Plug the AC cord into the AC outlet. Do not use an isolation transformer for this check.
2. Connect a 1.5k, 10 watt resistor in parallel with a 0.15µF capacitor between each exposed metallic part on the set and a good earth ground (see How to Find a Good Earth, below) as shown in the diagram below.



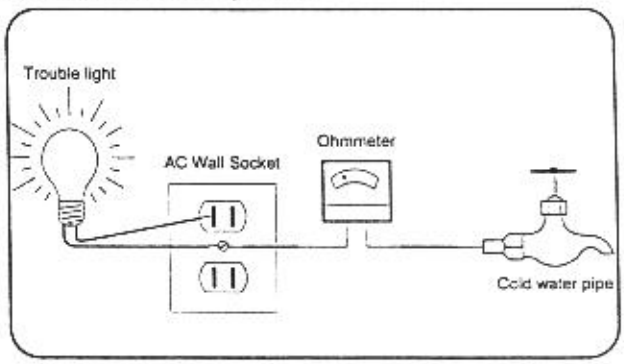
Example of Leakage Current Hot-Check Circuit

3. Use an AC voltmeter with 1000 ohms/volt or more sensitivity to measure the potential across the resistor.
4. Check each exposed metallic part, and measure the voltage at each point.
5. Reverse the polarity of the AC plug in the AC outlet and repeat the above measurements.
6. The potential at any point should not exceed 0.75 volt RMS. A leakage current tester (Simpson Model 229, RCA WT-540A or equivalent) may be used to make the hot checks.

Leakage current must not exceed 0.5 milliamp. If a measurement is outside of the specified limit, there is a possibility of a shock hazard and the monitor should be repaired and rechecked before it is returned to the customer.

How to Find A Good Earth

A cold water pipe is a guaranteed earth ground; the cover plate retaining screw on most AC outlet boxes is also at earth ground. If the retaining screw is to be used as your earth ground, verify that it is at ground by measuring the resistance between it and a cold water pipe with an ohmmeter. The reading should be zero (0) ohms. If a cold water pipe is not accessible, connect a 60-100 watt trouble light (not a neon lamp) between the hot side of an AC power receptacle and the retaining screw. Try both slots, if necessary, to locate the hot side of the line. The lamp should light at normal brilliance if the screw is at ground potential



How to Check for Earth Ground

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